

# **A Study To Determine The Occupational Health and Safety Knowledge, Practices And Injury Patterns Of Workers At A Specific Beverage Manufacturing Company**

**Dissertation submitted in fulfillment of the research  
requirements of the Master of Science in Physiotherapy Degree**

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i. **Declaration**

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## ii. Glossary

**Incidence Rate:** The incidence rate is calculated as the number of total occupational injuries times 100, divided by the average number of workers for the period.

**Disabling Injury:** Any occupational injury that prevents an employee from reporting for work or from effectively performing all the duties connected with the employee's regular work on any day subsequent to the day on which the occupational injury occurred, whether or not that subsequent day is a working day for the employee, or results in the loss by an employee of a body part or a complete loss of the usefulness of a body part or results in the permanent impairment of an employee.

**Non-Disabling Injury:** Any occupational injury that was not a disabling injury, and for which medical treatment was provided (minor injury).

**Time-Loss Injury:** Usually the same as a disabling injury, but for which compensation for loss of wages or disability has been paid.

**No-Time-Loss Injury:** Any occupational injury that was not a time-loss injury and for which medical treatment was provided, the cost of which was incurred by the province where the occupational injury took place.

**Time-Loss Injury Incidence Rate:** The time-loss injuries incidence rate is the number of time-loss injuries per 100 workers. This rate is calculated as the number of time-loss occupational injuries times 100, divided by the average number of workers for the period.

**Fatal Injury:** An occupational injury resulting in death.



***Fatality Incidence Rate:*** The number of deaths related to occupational injuries per 100, 000 workers over a given period.

***Occupational Injury:*** Any injury, disease or illness incurred by an employee in the performance of or in connection with his or her work.

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### iii. ABSTRACT

**Introduction:** Occupational injuries have not received adequate attention from physiotherapists at South African companies. Strategies to promote health and prevent injury have been hampered by the shortage of adequately trained health professionals. Developing countries have not kept pace with developed countries in terms of strategies to improve the health and safety of workers. An analysis of the occupational health and safety profile will assist in the development and implementation of effective strategies.

**Aim:** The aim of this study was to determine the occupational health and safety knowledge, practices and injury pattern of workers at a specific beverage manufacturing company.

**Methods:** The sample consisted of workers employed at a specific beverage manufacturing company in the greater Durban area. All level of workers regardless of age, gender or years of experience were included in this study. A self-designed semi-structured questionnaire with both open and closed-ended questions based on the health, safety and risk training manual was used to capture information in four categories from the participants. Questionnaires were distributed after a group discussion addressing Senior Management, Union Representatives and workers and were collected a week later. A site inspection was conducted to note the number of health and safety violations per worker present at the time. Retrospective injury data during the six-month study period were gathered from clinic records.

**Data Analysis:** Questionnaire responses were analysed using the Statistical Package for the Social Sciences. Percentages, frequencies, means, ranges and standard deviations were used to describe the data set. Pearson's correlation tests were used and deemed strong with an  $r$ -value of 0.80. Multivariate analysis was used to identify which factors were predictive of the number of sick days taken off work. The level of significance was set at 0.05.

**Results:** Data on the knowledge of health and safety at the workplace was gathered using a validated questionnaire relating to general safety, specific safety procedure and protocols and recommendations made by workers. The effective response rate for the questionnaires was 83.5%. One hundred and forty workers (51.3%) were unable to correctly list any of the general health and safety rules applicable to this company. With regard to specific safety knowledge, 154 workers (56.4%) failed to describe any safety procedures during a fire or explosion. Most workers (61.2%) recommended that onsite supervisors play a more proactive role in ensuring that health and safety measures are implemented within this company. Seventy two injuries (22%) were reported over the six-month study period obtained from the medical records. Incorrect manual materials handling was cited as the most common mechanism of injury with 42.5% of cases being reported. The lower back was the site of 43.1% of injuries with strains contributing 66.7% of injuries in this study. Department and gender were significant predictors of sick days taken off work, with workers in administration taking 2.2 extra days than those in the workshop and males taking off 3.6 extra days.

**Discussion and Conclusion:** The mechanisms, distribution and types of injuries were similar to those described by other authors. Of relevance is the high number of injuries reported at this specific beverage manufacturing company. This has implications for occupational health and safety training, medical management and rehabilitation. This study has revealed poor knowledge in the areas of general workplace health and specific safety procedures and protocols. Occupational health professionals, physiotherapists in particular, should actively disseminate current knowledge on health and safety. It is concluded that significantly more attention should be paid to the development, implementation and evaluation of the effectiveness of health promotion and injury prevention programmes at the workplace.

**KEYWORDS:** INDUSTRIAL STRATEGIES, INJURY, HEALTH AND SAFETY,  
BEVERAGE MANUFACTURING COMPANY, INDUSTRIAL WORKERS.

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## **1. INTRODUCTION**

### **1.1 Background to Study**

For decades occupational injuries have had a significant impact on the workplace worldwide. The reported prevalence of injury seems to vary between 0.2% in Peru to 20.9% in Austria (Distat, 1988). In developed countries like Canada some 3.3 million occupational injuries are reported annually (Statistics Canada, 1990). Recent trends of occupational injuries reported in Canada indicate no change in the past 10 years which suggests that existing prevention strategies have not been effective (Mandelcorn, Gomez and Cartotto, 2003).

In the USA national occupational injury statistics are derived from established surveys conducted by the Ministry of Labour Statistics (Wokutch, Josetta, McLaugh, 1992). Grall (1991) estimated that in the USA 32.5 million injuries are reported annually. A 2004 survey indicated a 2.6% increase in reported occupational injuries compared to 2003 (Zeal, 2005).

However, reported figures are thought to be conservative due to the lack of a uniform definition of occupational injury and the social and cultural stigma attached to injuries in many countries (Pope and Tarlov, 1991). In addition, the methods of reporting injury, data collection and analysis may vary from country to country (Bello, 1991).

Rapid advances in technology have subjected workers to the exposure to more dangerous newly developed machinery and undue psychological stressors beyond the limits of the individual (Alfredsson, Akerstedt, Mattsson, Wilborg, 1991). Several studies (Andrews, 1991; Aptel, 1988; Barr and Eberhard, 1991)

have indicated that these advances have resulted in many companies facing an increasing number of health and safety problems which include a lack of protective equipment, incorrect hand ergonomics, improper use of equipment and a disregard of occupational health and safety protocols.

History reveals that both modern and ancient societies have been slow to recognise and act upon hazards to which workers are exposed in the workplace (Teleky, 1948). With the Industrial Revolution came rapid industrialisation in many developing countries. However, it is only in modern times that industrial health and safety have become legally enforceable with the implementation of appropriate legislation and the establishment of adequate infrastructure within the working environment (Rantanen, 1990). Rantanen (1990) suggests that even more stringent legislation is required to address the issue of workers being exposed to unsafe working conditions.

In South Africa, occupational health and safety services have undergone many changes in the past decade. The most important change was in 1993 with the promulgation of the Occupational Health and Safety Act which was implemented in 1994. This Act led to a heightened awareness of employee health requirements and the need for a pro-active health and safety programme to monitor hazards in the workplace (Mahope, 1999). The provincial and national health authorities are now planning for the restructuring of health systems in both the public and private sectors with emphasis being placed on the development of occupational health services. This restructuring of the occupational health market is aimed at making occupational health practice increasingly effective (Myers, 1996).

The above changes introduced to the South African workplace health system pose great challenges to occupational health professionals. The physiotherapy profession in particular has a historical tradition of promoting health and preventing injury. However, the extent to which these activities have been applied in the occupational health sector has not been systematically determined (Ehrens, 2001). In the changing healthcare scenario in South Africa, health professionals need to prove that they can deliver a service to all who need it and that this service truly makes a difference (Eales, 2000). In particular, physiotherapists must demonstrate that their intervention skills are both relevant and cost-effective within the occupational health sector (Mothabeng, 2003) in order to maintain the credibility of the profession within this sector. There is also an increasing demand for physiotherapists to provide strong scientific evidence for their practice within the occupational health sector.

The study of injury has not received adequate attention by physiotherapists within South African companies (Begley, 1996). There is a poor understanding of the importance of occupational health and safety practices and this has caused a disintegrated approach to the management of injuries reported at the workplace (Mothabeng, 2000).

There appears to be several companies which do not yet effectively address the full scope of occupational health as part of their training programme. There is still little liaison with other health related professionals, poor formal risk assessments procedures and poor integration of relevant role players into the management of occupational injuries (Pretorius, 1999).

The company under investigation is an alcohol beverage manufacturing company. The role of the health and safety team at this company tries to ensure that the working environment is safe and free from hazards. This company is also committed in its moral and legal obligations to safeguard all workers and the public against injury and disease associated with its business (Adami, 1994). However, the extent of the knowledge and practices regarding occupational health and safety of workers at this company has not been established.

## **1.2 Significance of the Study**

This is the first study which aimed to document the different aspects of occupational health and safety at this specific beverage manufacturing company. This will hopefully lead to a greater awareness of the problem and consequent involvement of senior management regarding the prevention and management of occupational injuries. This broadened scope of occupational health and safety will make provision for health promotion and injury prevention programmes.

How does this study benefit this specific beverage company? This study might assist the company concerned in shifting the focus of the occupational health clinic from curative to preventive services by establishing baseline data in which can be used to monitor future occupational health and safety knowledge and practices.

An increasing rate of injuries might create a sense of fear and insecurity amongst workers. This in turn would affect the performance of the workforce and the productivity of the company (Muchinsky, 1987). This study would enable this specific beverage company to identify those injuries that occur most frequently as

well as those workers who are exposed most often to occupational hazards. In addition, it would enable this specific company to evaluate worker knowledge and practices with regard to safety measures and procedures. This specific company would be able to utilize the results of this study to improve the health and safety standards, which in turn could improve worker productivity.

The World Health Organisation (WHO) in 1991 proposed that all companies enforce health promotion in the workplace despite the uneven distribution of occupational health professionals. However, the pressures of limited time and resources has resulted in senior management seeking the fastest solution with regard to their decision making, as compared to reducing the risk element and uncertainty amongst the workforce (Kumar, 1992b).

How is this study relevant to the profession of physiotherapy? Physiotherapy forms an integral part of the healthcare system in South Africa and offers both curative and preventive services (Frantz, 2005). This study will encourage physiotherapists to mobilise their services within the occupational health sector thus reducing the health care burden placed on existing team members. Workplace rehabilitation is an area in which physiotherapists need to be visible. This study will also serve to motivate for the increase in employment of physiotherapists in the occupational health sector. Physiotherapists should be active partners in the dissemination of knowledge on health promotion and injury prevention strategies in the workplace. In doing so, physiotherapists can make a major cost-effective contribution to the prevention, control and management (Frantz, 2005) of occupational injuries.

### **1.3 Problem Statement**

Senior management at companies tend to concentrate more on improving productivity and protecting the company whereas good occupational health and safety is more about protecting the workers from injury and only secondarily about protecting the company's productivity. There is a paucity of knowledge around occupational health and safety within this specific beverage company. As such, many risk factors affecting the company are ignored. Thus the occupational health and safety profile at this specific beverage company needs to be explored.

### **1.4 General Aims and Specific Objectives**

#### **1.4.1 General Aims**

The general aims of this study are to determine baseline data of the a) knowledge, b) practices and c) injury patterns of workers regarding occupational health and safety at a specific beverage manufacturing company.

#### **1.4.2 Specific Objectives**

The specific objectives are structured according to:

##### **Occupational Health and Safety Knowledge:**

- (a) To describe the knowledge of workers regarding occupational health and safety by determining the percentage of correct responses to a questionnaire.
- (b) To establish worker recommendations regarding occupational health and safety.

- (c) To determine whether there is a significant difference between the knowledge of workers in the workshop department and administrative support department.

**Occupational Health and Safety Practices:**

- (d) To monitor the compliance of workers regarding occupational health and safety procedures and protocols by observing the company's activities over the course of two weeks and noting how many and what safety violations took place over that period of time, calculated as the number of violations per worker present at the time.

**Injury Patterns:**

- (e) To establish retrospectively the frequency of the type, anatomical sites and mechanism of injuries reported on duty to the occupational health clinic during a six-month period.
- (f) To classify the types of injuries according to anatomical sites and mechanisms of injury sustained during a six-month period.
- (g) To determine the mean number of injuries per month during a six-month period and to establish whether certain injuries are seasonal, i.e. occur with greater frequency in certain months.
- (h) To determine whether there is a significant difference in the mean number of sick days as a result of occupational injury over a six-month period that the following groups of workers take off work:
  - (a) Males and females
  - (b) General workers and administrative support staff

- (i) To determine whether there is a significant difference in the mean number of shifts worked per week between males and females.
- (j) To determine whether there is a significant difference between the mean number of reported injuries on duty between males and females.
- (k) To determine whether there is an association between injury and gender and work setting.
- (l) To determine which types of injury result in the most number of sick days taken off work.
- (m) To determine whether there is a significant correlation between the age of workers and the number of days taken off work as sick leave for occupational injury.
- (n) To determine which factors predict the number of sick days taken off work.

### 1.5 **Summary**

In summary, the health and safety knowledge, practices and injury patterns of workers are important steps in establishing a baseline occupational health and safety profile for this company. This study will therefore document the knowledge (questionnaire based on the health, safety and risk training manual), practices (observation of performance) and pattern of injuries (injury surveillance). This research is also important to the profession of physiotherapy as physiotherapists form an integral part of the occupational health team.



## 2. LITERATURE REVIEW

*" I'm assigned [to] certain violent and irregular motions and unnatural postures...by which...the natural structure of the living machine is so impaired that serious injury generally develops " (Cromwell, 1979).*

### 2.1 Introduction

An extensive literature search was conducted to highlight occupational injuries and the factors contributing to these injuries within high and low risk industries, with special attention being placed on the manufacturing industry. This literature was obtained by searching the PubMed and FindArticles databases using keywords such as injury, industrial strategies, health and safety, beverage manufacturing industry and industrial workers. This search yielded in excess of 2232 papers. All papers in English on work-related injury at the workplace were acquired and reviewed. Papers appearing as abstracts were read and the full papers of those abstracts that appeared to be pertinent to this study were acquired and reviewed. This review aims to clarify the definition of occupational injury and to identify the historical perspective of industrial health, to described relevant legislation pertaining to occupational health and safety, to address health promotion and injury prevention strategies from a global perspective and to outline the role of the occupational health team in relation to the management of occupational injuries.

### 2.2 Definition of Occupational Injury

When investigating the factors contributing to industrial injuries it is imperative to first define *Occupational Injury*. However, a review of the literature has shown no consensus about its definition and that definitions of occupational injury vary substantially between different countries and different industries. Basmajian and DeLuca (1985) define injury as damage to the tissues as a result of exceeding the

limits of maximal strain of the tissues. Hendrikse (1994) defines injury as physical harm that may cause temporary or prolonged impairment of the body in a way that part of the body is functionally useless or part of the internal bodily system is inhibited in its normal function. Bird (1996) defines injury as any adverse effects or potential adverse effects of accidents that may be minor, serious or catastrophic as compared to Karwowski (1991) who states that injury is a result of physical, psychological and mental damage that may or may not be irreversible. Although there are numerous and varied definitions of injury, the following definition is considered appropriate to this study:

*Occupational Injury is a term used to encompass the occurrence of a harmful condition sustained by the body as a result of an accident and can take any form from a less serious abrasion or bruise to a laceration or a more serious effect such as a fracture, penetration of a foreign body, burns or electric shock, all of which may or may not cause permanent deformation, malfunction and even fatal consequences (National Association of Sciences, 1985).*

### **2.3 Historical Review and Origins of Injury**

The importance of industrial health issues has only recently been recognised by many health and safety professionals, yet the concepts of ergonomics have been acknowledged for more than 200 years (McCormick and Sanders, 1982). Christensen (1987) classified the history of industrial health into two major periods: The first period being the *Age of Tools* which goes back to prehistoric humans and the next major period being the *Industrial Revolution*.

The *Age of Tools* period dates back to tradesmen who made their own tools that contoured to their hands, felt comfortable and enabled them to perform optimally, as

compared to the *Industrial Revolution* that was characterised by applications in industry with an emphasis on adapting people to their work through selection, classification, training and adjustments of work schedules (Christensen, 1987). The main focus after the industrial revolution was aimed at improving work efficiency through task analysis and design (Chaffin and Andersson, 1984).

For several centuries the origins of human injuries have been regarded either as random and unavoidable occurrences or as consequences of human carelessness (Bonnie and Guyer, 2002b). The greatest time of growth in industrial health occurred after World War II. It was at this time that technology and human sciences were applied to the problems that arose from the use of complex machinery (Dul and Weerdmeester, 1993). The need to improve equipment designs was recognised in the early twentieth century (Chaffin and Andersson, 1984) while in the later twentieth century the focus shifted toward rearranging hazardous job elements to ensure only necessary biomechanical movements for more efficient task completion (Christensen, 1987).

Ultimately, the goal is to ensure that the conditions in which people work remain healthy and that the occurrence of death and disability attributed to disease and injury is reduced in the ever-evolving nature of occupational hazards (Bonnie and Guyer, 2002a).

## **2.4 Human and Institutional Costs of Industrial Injury**

The cost of industrial injuries to both individuals and to industries is considerable. In the USA, the costs of industrial injuries can amount to at least 184 billion dollars per year (Waters, 2000). According to the South African Bureau of Labour Statistics (Global Services Network, 2004) a total estimate of 6.2 million injuries and illnesses

are reported in industrial workplaces annually, resulting in an average of 7.4 cases per 100 full-time workers.

Internationally, the cost to industries for the most common type of work-related injury (i.e. a back injury) surpassed 4000 dollars per injury by 1996. It is further estimated that the average costs for other work-related injuries (e.g. slip-and-fall accidents; being struck by falling objects; stepping on, striking against or being struck by objects; caught in, on or between objects; falls from above; falls at ground level; strain, over-exertion or strenuous movements; electric contact or exposure; exposure to or contact with harmful substances or radiation and inhalation injuries) can cost between five to six hundred dollars per injury (Cobb, 1999).

In South Africa, the costs of injuries are divided into two parts, namely, insured and uninsured costs. Insured costs are those paid out to the industry or worker by the insurance company or the Compensation Commissioner. Uninsured costs are those hidden costs that are paid for the worker and affect productivity of the industry. Some of these hidden costs include time lost in investigating the nature of the injury, time lost to training and selecting a new or other worker to take over the job and decreased output when the worker returns to work and is unable to perform his duties because of his injury. These hidden costs are unfortunately not reflected in the accounting systems of most industries and do not reflect the personal suffering that the individual experiences as a result of injury (Brune and Edling, 1999)

The cost of preventing injuries is also significant. In South Africa, the budget for mandatory on-the-job training requirements has increased drastically over the last few years with upper management showing a lack of enthusiasm at this expenditure (Adams, 2003).

According to Andrews (2003) the health and safety management team must strategically plan aggressive cost saving goals to be reached by specific target dates. Such goals should include reducing direct worker compensation costs, outstanding liabilities, repeated claimants and the number of lost work days (Duggin, 2004). To meet these goals, four priority action plans must be implemented to produce rapid and sustained cost savings. These include clearly demonstrating an increased commitment to reducing worker compensation costs as a long-term management priority; establishing incentives both within and outside the industry to minimise financial risk from existing and future cases; adopting a proactive management system for worker compensation that includes a broad organisational strategy and a well focused injury management system and implementing an integrated managed care network that will provide quality care, goal oriented follow-up and commitment to returning the injured worker to health, work and productivity (Bowling, 2001).

In a study on reducing costs carried out in the USA, most industries that examined the actual worker compensation payouts realised that only 45 cents of every worker compensation dollar goes towards providing care for the injured worker, while the other 55 cents goes toward indemnity costs. Repeated claimants accounted for 37 percent of compensation costs, even though these workers represented just 2 percent of the total workforce while open cases (i.e. cases that are already active) represent just 3.5 percent of claims but 51 percent of the costs (Noble, 1999). The compensation costs of open cases are further exacerbated with delays of 100 days or more (Bowling et al., 2002). In every three-year period, workers are paid for an estimated 36 sick days in which they did not work (Charvis, 2004).

## **2.5 Injury Classification**

### **Types and Categories of Injury**

Injury can be classified as being either fatal or non-fatal. Non-fatal injuries are further sub-classified as being permanent or temporary (Jeyaratnam, 1992). There are three basic categories of injuries associated with occupational injury. These categories include minor injuries that require first aid treatment, injuries causing temporary disablement and injuries causing permanent disablement that may be partial, total or fatal (Kazarian, 1981). In partial disablement the worker is temporarily prevented from performing his/her normal duties and injuries in this category include eye splashes, lacerations, strains and fractures. Total disablement occurs when there is permanent damage to the injured workers' body that prevents the worker from being employed again. The injuries in this category include loss of sight and/or limbs, mental disability and brain damage. Fatal injuries that may result in the death of workers include fires, explosions, falls and human error (Rogers and Salvage, 1988).

## **2.6 Epidemiology of Injury**

### **Epidemiology of Injury – National Statistics of South Africa**

In order to describe the incidence or prevalence of injury, the most important variables in defining industrial injury must be considered. These include the total number of people employed in the industry and the data based on the number of people working in unsafe, unhealthy or hazardous workplaces (Francais, 2000). However, these variables contain certain limitations. Firstly, estimates of the number of people working in the particular industry are prone to considerable uncertainty as statistics do not include unregistered jobs and secondly, there is a general lack of routine workplace monitoring, possibly due to constant changes in work-related activities and worker-related behaviour (Varty, 2002).

In 1991, the occupational injury prevalence rate was estimated at 7.21% per 1000 workers in South Africa (Report on the 1991 Workman's Compensation Act

Statistics). By 1995, this figure had increased to 7.91% per 1000 workers (Report on the 1995 Workman's Compensation Act statistics). According to the Workman's Compensation Act Statistics (1995) the province with the highest occupational injury prevalence was the Western Cape estimated at 13.77% per 1000 workers and the province with the lowest occupation injury prevalence was Mpumalanga estimated at 2.19% per 1000 workers, the highest occupational injury prevalence reported by females was in the Gauteng province estimated at 0.4% per 1000 workers and the highest occupational injury prevalence reported by males was in the Western Cape province estimated at 13.47% per 1000 workers.

## **Epidemiology of Injury – Causes of Injury**

### **Introduction**

The direct causes of industrial injuries result from unsafe conditions at the workplace. These unsafe working conditions must be controlled so that injuries can be prevented (Sahley, 2004). According to Oordt and Aardt (1994), three basic factors in combination are the cause for industrial injuries, namely, defective equipment to perform a task, an unpleasant working environment and an inadequately trained worker. Gordon (2002) states that it is important to understand that the causes of injuries at the workplace result from factors that need to be identified and eliminated. The factors mentioned below are some of the common causes contributing to industrial injuries.

### **Fatigue and Boredom**

The relationship between fatigue and injury is complex. An extreme state of fatigue is termed exhaustion (Craig and Kakumanu, 2002). Fatigue influences individuals differently. Workers who are interested in their jobs will give all their attention to it while workers who are bored often become inattentive and careless about the task at

hand (Scitovsky, 1999). Injuries are related not only to physical fatigue, but also to the mental attitude of the worker (Rynk, 2003). Caruba (2001) believes that the general working environment must be improved to create interest and job satisfaction.

### **Experience and Inexperience**

Several studies have shown that inexperience contributes significantly to work-related injuries and that a new worker who is not familiar with the workplace may be easily distracted (Deveney, 2003; Konar, 2002; Ralske, 1999). Insufficient skill in the workplace has been identified as a contributory factor to injury. According to Deveney (2003) it is essential that inexperienced workers go through a period of training and orientation before being given tasks that may cause injury. In contrast, experienced workers are not unfamiliar to the surroundings of their workplace or their jobs but tend to take greater risks and are less careful (Heckert et al., 2002). If no serious injury occurs at the workplace for a considerable period of time, workers tend to become less careful because they believe that the danger is not as serious as previously anticipated and basic safety measures are often neglected (Adami, 1994). Kuther (2003) suggests that management must constantly ensure that both experienced and inexperienced workers are monitored and supervised appropriately.

### **Psychosocial factors**

Some injuries can be attributed to the psychosocial status of the worker (Lewandowski, 2003). There are alarming figures of workers who are dependant on drugs and alcohol to reduce stress levels. In a study by Lewis and Cooper (1989) on the effects of drug abuse on work-related injuries at a Texas-based oil and gas industry, it was shown that of the 172 workers that underwent drug screens, 87.8% had detectable traces of drugs which had the potential to alter physiological functions



needed to avoid injury. A Nigerian study by Ezenwa (2001) stated that over 14.1% of injuries reported in the food, beverage and tobacco industries were as a result of alcohol abuse. Wild, Ebbers, Shelley, Gmelch, (2003) suggested that early recognition is the key to a successful drug and alcohol rehabilitation programme and that industrial legislation should make special provision for workers affected by alcohol and drug abuse.

Psychological problems at the workplace include attitudes and emotions that play an important role in determining and directing the behaviour of a worker. This behaviour may be positive if the worker displays an attitude that is positively directed to safety, but negative if the behaviour is negligent and reckless (Flouri and Buchanan, 2002). In effectively managing psychosocial behaviours, the supervisor must be actively involved in the identification and subsequent handling of workers with destructive behaviour (Schaefer-Schiomo and Ginsberg, 2003).

### **Personal and work-related factors**

Personal and work-related factors include human, environment, mechanical, equipment, standards and procedural inadequacies which may directly or indirectly result in unsafe working conditions (Ralske, 1999). Personal factors can include a lack of knowledge, skill, physical defects, mental defects and an improper attitude (Frings, 2001). Work-related factors may include a lack of appropriate equipment, a lack of clear job tasks and procedures, a lack of standards in machine safeguarding and limited personal protective equipment (Emigh, 1998).

The available literature about the health and safety policies and procedures guiding workers with personal and work-related concerns in developing countries is scarce as compared to international contributions from developed countries. In developed

countries like the USA and Canada, the essential health and safety policies and procedures to guide workers on personal and safety issues already exist (Thomas, Kellogg, Erickson, 2001). The significant personal and work-related causes of injuries in the workplace are discussed below.

### **Personal Factors:**

#### **Alcoholism**

Alcoholic beverages contain many chemical substances which are responsible for the undesired physiological and psychological effects, feelings of temporal euphoria and freedom from inhibition (Avogaro, 1990). Physiological evidence suggests that alcohol taken in limited doses is beneficial to the cardiovascular system while excessive dosages in the human bloodstream have neurological effects (Marczynski, Welte, Marshall, Ferby, 1999). With an increase in blood alcohol content (BAC) impairments occur in judgement, language, sight, memory, ability to understand and plan, motor control and body posture. Reception and perception of sensory inputs and appropriate responses are diminished with large mood and emotional swings occurring (Schuckit, Smith, Danko, Isacescu, 2003).

Long-term excessive use of alcohol can show pathological effects with toxic changes occurring in the brain and muscle. Metabolic derangement occurs in the intestinal system with interruptions in absorption, digestion and utilisation of nutrients (Miller and Gold, 1991). The strength of the effects of alcohol depends on the time of day with the effects being stronger in the early afternoon than in the evening (Horne and Gibbons, 1991).

## **Job Stress**

Job stress is highly subjective and complex and may result in variations between different workers in their perceptions of stress in a constantly changing workplace (McVicar, 2003). Stressors related to job strain and hypertension have been well documented (Dzietham, Nembhard, Collins, Davis, 2004). These include the socio-demographic and lifestyle characteristics of workers, their specific job requirements, occupational status, previous layoff experiences and educational levels of the workers (Jamison, Wallace, Jamison, 2004). Another researcher has identified other potential factors. These included workload, leadership or management style, professional conflict, lack of reward and shiftworking (McVicar, 2003). Workers who had more than 15 years of experience, a senior employee rank, experienced divorce and had no leisure activities and hobbies were found to have the highest work-related stress levels (Deschamps, Paganon-Badinier, Marchand, Merle, 2003). Workers who experienced the burden of job pressure showed characteristics of anxiety, vulnerability, having little or no control over their difficult behaviour and being deliberately unpredictable (Brodaty, Draper, Low, 2003).

According to Lee (2003) developing countries report more burnout experiences than developed countries with the healthcare industry experiencing the highest incidence of job stress. Pelfrene et al., (2003) examined the relationship of perceived job stress to coronary risk and found that high strain jobs were strongly associated with total coronary risk with an increased chance of developing coronary heart disease. Carroll et al., (2003) found that there was a significant increase in systolic blood pressure reactions to stress but no association was found for diastolic blood pressure reactions. Brake and Bates (2003) concluded that industrial mine workers who were exposed to thermal stress under extended work shifts suffered fluid losses and dehydration by mid-shift. The source of job stress and the working conditions which

exacerbate the symptoms of stress were identified as important factors in order to develop workplace strategies for coping with stressors while on duty (Aameri, 2003).

Numerous studies (Hammer et al., 2004; Roth et al., 2003; Shimazu, Okada, Sakamoto, Miura, 2003; Steinhardt, Dolbier, Gottlieb, McCalister, 2003; Wee and Myers, 2003) have indicated that job satisfaction, a good supervisor relationship, worker cohesion and support, expanding the workplace psychosocial environment and an effective stress management programme can significantly reduce job stress. Shimazu et al., (2003) has suggested that subgroups with high job control and stress be equipped with enhanced coping skills and increased social support. According to Wilson (2002) career counselling forms an important influence in determining career behaviours and guides the worker in using interventions to facilitate improved worker relationships.

### **Sleep Deprivation**

Sleep is needed by the brain to reconstitute, a process that cannot take place sufficiently during waking relaxation (Horne, 1985). According to Horne (1988) the first five to six hours of regular sleep are obligatory to retain psychological performance at normal level. An earlier study by Froberg (1985) showed that two or more nights of sleep deprivation reduced motivation to perform, increased behavioural irritability and speech slurring in shift workers at a security company.

### **Work-related Factors:**

#### **Workstation Design**

A work surface that is either too high or too low can force the worker into awkward and stressful postures. The working surface must allow for sufficient posture movement in all directions (Nemeth and Balint, 1991). According to Sanders and

McCormick (1993) four basic workplace design principles can be applied to improve workstation arrangement and work flow while reducing risk factors, namely, placing the important components of a job in convenient locations, placing the frequently used components near workers who use them the most, grouping components that have similar function and arranging components that have a sequential relationship in performing a task.

### **Prolonged Standing and Seating**

Workers who are required to stand for prolonged periods are at an increased risk for back injuries (Grandjean, 1988) and associated musculoskeletal disorders (Lehman, Psihogios, Meulenbroek, 2001). Standing workstations should provide a sit-stand stool, foot railing and an anti-fatigue matting to relieve some of the stress placed on the lower extremities and back (Redfern and Chaffin, 1988). A number of recommendations have been published regarding chair design. According to the American National Standards Institute (ANSI, 1988) the critical seat features include criteria for seat height, seat-pan depth, width and slope.

### **Reach Distances**

Overhead reaching and static holding activities increase the risk for back, shoulder and upper extremity injuries (Chaffin and Andersson, 1991). Overhead reach distances should be set for the shortest worker so that all workers would be able to reach the highest level of the shelf comfortably. Shoulder fatigue develops quickly as the shoulder flexes forward (Huchingson, 1990). A thorough evaluation is important to determine the reaching distance for specific workers. This will allow for most workers to be fairly accommodated by placing objects within their reach distance (Partanen et al., 2002).

## **Hand Tools**

Hand tools are used in many industries. However, improperly designed tools can lead to injuries, accidents and cumulative trauma disorders (Punnett and Beek, 2000). Common problems seen with hand tools include awkward positions, mechanical compression, vibration and forceful exertions (Greenberg and Chaffin, 1989). The shortcomings of hand-tool designs are easy to identify and the majority of these problems can be resolved by applying basic principles according to the hand-tool assessment checklist (Pentikis, 1995).

## **Manual Materials Handling**

Handling material requires exerting energy or force to lift, push, pull carry or hold objects. Handling materials over many hours in repetitive activities decreases the energetic efficiency of the human body (NIOSH, 1981). Material handling are among the most frequent and most severe causes of injury worldwide (Buis, 1990; Davis, 1985; Evans, 1990; Gilad and Kirschenbaum, 1986; NAOS, 1985; National Institute of Occupational Safety and Health, 1985; Kroemer, 1989). Solutions to manual materials handling would require significant changes to the workplace. The safety team must take an active role in reducing or eliminating the risk factors associated with material handling tasks (O'Toole, 2002).

## **Personal Protective Equipment**

Personal protective equipment (PPE) are devices that serve as barriers between a hazard and the worker. PPE should fit properly and not increase work stressors (Arledge, 2003). Anti-vibration gloves are an example of PPE because they act as a barrier between the source of vibration and the hand (NIOSH, 1994). PPE should be provided in a variety of sizes and accommodate the physical requirements of each

worker and the job to ensure that the critical protection required is provided (Sostrom, 1999).

### **Prolonged Hours of Work**

Some workers are required to work continuously for prolonged periods of time. This predisposes the worker to several negative effects (Melamed et al., 1999). Long periods of work can be associated with sleep deprivation and deteriorating performance in terms of reaction time, failure to respond, slowed cognition and diminished memory capacity (Froeberg, 1985). In addition, the performance of monotonous tasks is highly reduced following sleep deprivation (Wedderburn, 1987). Performance of different types of work is affected differently by long periods of work. Numerous studies (Dinges, Chenoweth, Patton, 1997; Knauth, 1995; Quera-Salva, Nicholls, Grieve, 1997) have shown that execution of tasks performed uninterruptedly decreases work performance with each successive repetition.

### **Shift Work**

Shift work can be classified as either continuous or discontinuous. Continuous shift work means attending the workplace at regular times whereas discontinuous shift work involves attending at varying times outside the regular day work (Kogi, 1991). The regular day work involves an eight hour five day arrangement, which was introduced in many countries in the 1960s (Monk and Tepas, 1985). According to Kogi (1985) the duration of the shift, the number of consecutive shifts and the number of shift teams may affect the welfare of the shift worker, the work performance and the organisational scheduling. Working shifts that are in excess of twelve hours are likely to introduce drowsiness, reduced cognitive abilities and decreased work performance (Wedderburn, 1987). According to Rosa, Tepas, Mahan (1988) long shifts increases fatigue and there is increased potential for unsafe

work practices especially tasks requiring high cognitive or information processing demands and those with extensive repetition.

## **Epidemiology of Injury – Industrial Demographics**

### **Introduction**

The working environment and the characteristics of the workforce are contributing factors in determining which populations are at risk for industrial injuries. Inadequate job training, little experience of the task and an attitude not directed towards safety are some of the major factors contributing to injuries while on duty (WHO, 1991). According to Bell et al., (1990) an industry is classified as being either high risk or low risk. An overview of the factors contributing to industrial injuries in high risk, low risk and in various parts of the world is described below.

### **High Risk Industries:**

#### **Chemical Industry**

The most common injuries in the chemical industry include, eye injuries, burns and ergonomic disorders (Bell et al., 1990). The increasing risk of injury has been attributed to the lack of knowledge and inappropriate use of personal protective equipment among workers using hazardous chemicals (Austin, 2000). In South Africa, the introduction of specific regulations for Hazardous Chemical Substances (HCS) has required the employer to ensure that adequate and appropriate information is available to the worker with regard to any substances that may be deemed harmful (Ehrlich, 2000). This legislative requirement led to the development of training documents containing specific information relating to the hazardous nature of products used in chemical industries. These training documents contain information on the potential health effects of hazardous chemicals, the correct use of personal protective equipment and protocols regarding emergencies in the workplace



(Gardener, 2000). According to Austin (2000) the correct use of a hazardous product reduces chemical exposure and thus an overall lowered risk of developing injuries.

### **Catering Industry**

The most common injuries in the catering industry include cuts, lacerations and burns. Chefs were identified as the occupational group with the highest risk of industrial injury (Gleeson, 2001). A lack of established occupational health services together with poor planning and implementation of an effective health and safety management system have contributed to the increase in injuries within the catering industry (Bush, 2004).

### **Mining Industry**

The most common injuries in the mining industry include musculoskeletal injuries, ergonomic disorders, back pain, fractures and injuries due to the exposure to radioactive materials (Bell et al., 1990). According to Quarry (2003) industrial personnel concerned with radioactivity must be well informed of the hazards of radioactive compounds due to the tremendous increase in the spread of contamination and risks of inhalation and ingestion. Adequate ventilation of working areas and a high standard of personal cleanliness together with the use of special protective clothing, breathing apparatuses and masks are essential (Harrington, 1999).

### **Construction and Transport Industry**

Employees within these industries are required to utilise large equipment and complex machinery. This predisposes workers to elevated risks of developing work-related musculoskeletal disorders of the upper and lower extremities (Damlund, Goth, Hasle, Munk, 1982; Burkhard, Schulte, Robinson, 1993; Holstrom, Fines,

Hase, 1993). However, little has been done to systematically identify the hazards for specific construction trades and operations (Schneider and Susi, 1994). Many employees within the construction industry work at unsafe heights. This has resulted in an increase in the incidence of falls, fractures and head injuries associated with the construction industry. In addition, motor vehicle related injuries are found to be linked to the transportation industry (Lipscomb, Dement, Rodriguez-Acosta, 2000).

### **Agricultural / Farming / Forestry Industry**

The most common injuries in these industries are motor and machine related (Burgess, 1982). The use of machinery has rapidly increased in the agricultural industry. This increase has accounted for a 5% increase in reported injuries in countries such as USA, Uganda, Kenya and Tanzania (Kamoing, 1987). The highest incidence of reported injuries occurred in organized large-scale agricultural sectors even though the machinery was well maintained under close supervision of management, trade unions and health and safety services (Shilla, 1987). When considering agricultural mechanisation the health and safety implications must be considered. The solutions required to reduce injuries include ergonomically designed machines, maintenance of machines and tools and worker education (WHO, 1991).

### **Manufacturing Industry**

The most common injuries in the manufacturing industry include machine related injuries, noise induced hearing loss, repetitive strain injuries, low back pain and ergonomic disorders (Bell et al., 1990). In a study on injury prevention training in Britain by Duff, Hoghton, Scheepers (2000), the contributing factors were identified as a three-fold mechanism, namely, human error, mechanical error and unsafe working environments. With regard to machine related injuries, the predominant causes include unsafe machinery and inadequately trained workers. Management for

these injuries include medical care together with rehabilitation geared towards functional restoration (Metzgar, 2003).

### **Low Risk Industries:**

Industries in the low risk category are finance, insurance and real estate industries. The most common injuries that are prevalent in low risk industries are stress related injuries (Bell et al., 1990).

### **Epidemiology of injuries – Anatomical Sites and Pathology in a Manufacturing Industry**

#### **Noise induced hearing loss**

Noise is one of the most widespread physical hazards in industry (Jeyaratnam, 1992). Exposure to intense noise can cause temporary or permanent hearing loss. Temporary hearing loss occurs after a few minutes of exposure to intense noise and is reversible only after a period of time away from the source. However, when exposure to intense noise occurs over a period of years, then only partial recovery of hearing is possible (Kenyon, 2000). From a global perspective, noise levels in most industries are usually of such a nature that they could lead to hearing loss or specifically noise-induced hearing loss (Brits, 1999). The accurate measurement of noise and the determining of noise levels within the work environment are crucial for noise control. Without accurate measurements of noise levels appropriate protective equipment cannot be selected (Kenyon, 2000). According to Gomes, Lloyd, Norman (2002) the non-use of personal protective equipment affected ear health amongst workers at a soft-drink bottling industry. Industry noise levels contribute significantly to noise-induced hearing loss in many who are subjected to this noise over extended periods of time (South African Bureau of Standards, 1996). Noise problems should

ideally be considered at the time of installation of machinery, planning of buildings, or preferably right from the design stages of the industrial process (SABS, 1994).

### **Repetitive strain injury**

Repetitive strain injury is caused by overuse of the musculoskeletal system in which chronic discomfort, pain and functional impairment may develop as a result of numerous repeated movements (Occupational Safety and Health Administration, 1995). Treatment of injury is carried out with specific advice given to the worker to avoid repetition of injury. The worker is kept on light duty work while undergoing treatment. This process is continued until the worker is completely rehabilitated for return to heavy duty work (Guidotti, 1992). Every worker with a job description that involves repetitive hand and wrist movements are gradually progressed to their occupational function following injury. These workers are instructed to report to the supervisor at the first sign of discomfort and are reallocated to lighter duties (Krucoff and Krucoff, 2001). Repetitive work tasks must be modified to allow for more beneficial postures for workers with specific disabilities (Ayoub, 2002).

### **Low back pain**

Low back pain (LBP) is the most common complaint and cause of lost production time in the industrial sector of the economy (Steward et al., 2001). This is costly not only to the particular industry but also to the health care providers (Spengler, Jackson, Brown, 1986). These enormous economic losses accounts for the largest percentage of workman's compensation benefit payments for illness and injury (Bork, Bowman, Turek, 1996). In the USA, low back pain is identified as the most frequent cause of disability among the workforce of persons under the age of 45 years (Mierzejewski, 1997). In Canada, LBP is the cause of 27% of all compensable injuries (Statistics Canada, 1995). LBP cuts across gender, race and the working

environment (Igumbor, 2003). However, certain industries have been identified as more susceptible than others. Specifically, the healthcare industry has the highest occurrence rate of occupational injuries and associated LBP than any other service sector (Bork et al., 1996; Stellman, 1982).

LBP is the most common diagnosis for which patients are treated in outpatient physiotherapy settings (Jette, Marks, Frost, 1991). Another aspect of LBP that is of interest to industrial therapists are work-related postures, in particular the seated work postures. There are many office workers who have seated workstations that are poorly designed and ergonomically unacceptable. The result is a contribution to LBP and reduced efficiency (Wellbery, 2004).

Workers involved in lifting and manual materials handling are particularly at risk of developing LBP (Frymoyer, Casey, Finnoch, 1983). The preventative options used previously have been to train staff in correct lifting techniques and to select staff that are unlikely to develop work associated problems by the use of physical fitness tests, isometric strength tests and previous history of LBP (Scholey and Hair, 1989). The problem with training workers in correct lifting techniques is that the correct techniques could not be applied in all work situations. According to Jones (1972) no single lifting technique is the best for all situations and so the use of poor lifting techniques is therefore inevitable.

However, back problems have a multi-factorial aetiology and so a single factor strategy is unlikely to be successful. Clinical evidence shows that a successful strategy is one that encompasses as many of the factors as practicable (Andersson, 1991). Stryker, McGlothlin, Bobick (1989) proposed a strategy that looks at all aspects of the worker-work system for factors that could affect the amount of back

stress in that system. The first part of the strategy is to organise the magnitude of significant factors into a single model of work associated back problems. These factors are then grouped under five headings, namely, task, organisation, environment, equipment and personnel. To enable change in all areas of reducing back stress specific multidisciplinary rehabilitation training programmes must be implemented (Sadovsky, 2002).

Several studies (Bork et al., 1996; Cromie, Herrin, Keyserling, 2000; Garg, Nyran, Roberts, 1991) have indicated that approximately one-half of low back injuries are associated with incorrect lifting techniques. Kroemer (1992) suggested that training in safe lifting techniques must target all workers performing manual material handling activities to reduce injuries, develop specific material handling skills and to create awareness and self-responsibility. Sharp and Legg (1988) reported that after only four weeks of physical training, initially inexperienced lifters increased their work output significantly while maintaining their energy expenditure. This significance was attributed to improved neuromuscular co-ordination and muscular endurance. Genaidy, Gupta, Alshedi (1990) used six weeks of physical training and found improvements in muscular endurance, muscular strength and cardiovascular endurance. However, Byrnes and Clarkson (1986) reported that excessive training can lead to muscle soreness which is apparently related to damage in muscle tissue.

Hayne (1981) suggested that the three essential components of a successful physical training programme are knowledge, instruction and practice. Statistically, LBP has been strongly correlated to job satisfaction (Hultman, 1987) and attitude (Biering-Sorensen and Thomsen, 1986; Gentry, Show, Thomas, 1977). To minimise the possibility of human error, reduce fatigue, produce maximal effectiveness of effort and eliminate any risk to workers in the workplace, it is necessary to adopt a

scientific approach based on anatomical, physiological and psychological considerations (Bretten, 1990).

Industrial therapists have traditionally advocated that workers lower themselves to the load by bending their hips and knees and keeping the back straight. Yet, biomechanical and physiological research has shown that the leg muscles used in the lift sometimes lack the needed strength and that awkward and stressful postures are assumed when this lifting technique is enforced in unsuitable circumstances (National Safety Council, 1971).

An estimated every second person returns to work within one week after an incident of LBP. With an increasing duration of absence from work, the successful return becomes less likely. Nine out of ten LBP sufferers return to light duty work based on medical recommendation. The successful return of workers above 45 years is estimated to be half of that of workers younger than 24. Younger workers have more frequent but less severe back disorders than older workers. The largest incidence rates for LBP are between 24 and 34 for females and between 20 and 24 for males. More compensation cases are reported for males than for females (Andersson, 1991). Snook (1988) attributes the psychological disability and illness behaviour of the worker with the lack of follow-up and no work modification following LBP within the work environment as major deterrents to the return-to-work process.

### **Environmental stressors**

Advanced technology has subjected workers to conditions where they are exposed to toxic chemicals at extreme temperatures (Alfredsson et al., 1991). Low temperatures have been shown to reduce the dexterity and sensitivity of the hand, increase grip force requirements and exacerbate the effects of localised vibration (American

Conference of Government Industrial Health, 1995). According to Nema (2003) suitable equipment at workstations must be provided to enhance work performance. Although the needs vary from one working environment to another, creating a safe working culture by using a systematic approach to examine work errors and working together to create an organisation that is designed to minimise the factors that contribute to errors is essential (Beyea, 2004). This includes protecting workers against hazards by the correct use of personal protective equipment (PPE), maintaining optimal performance by encouraging proper ergonomic practices and providing an emergency warning in the event of a crisis (ISO-Edition, 1995). This is done so that no worker is stressed beyond the proper limit and no mechanical system be forced to operate at less than the full capacity (Kroemer, 1995).

### **Postural and ergonomic disorders**

Posture can be defined as the position of the body in any environment or mode and may include sitting, standing, walking or leaning forward (Rossi, 2001). Ergonomics on the other hand involves the evaluation by a specialist of the workplace and its furnishings, tools and tasks in relation to the physical abilities of the worker (Fanucchi, 2001). Hines (2002) suggests that workers must be advised about the basic risk factors and postural abnormalities that contribute to injuries and the prevention strategies that can promote a positive approach to the care of the human body.

The leading cause of abnormal posture is found to be directly related to poor ergonomics and may contribute to pain and dysfunction (Shelton, 2003). Awkward postures contribute to muscle fatigue, tendon fatigue, joint soreness and increased forces on the spine (Aaras, Westgaard, Stranden, 1988). The role of the industrial physical therapist in giving appropriate advice and instructions on correct lifting



techniques and working postures is fundamental to promoting good posture (Idaho, 2003). The posture of all workers should be supervised and corrected to the specific needs of the working environment and job requirements (Egerman, 2001). Machines should be at the correct height and angle in order to minimise strain (Shaw, 1986). Ergonomic principles should be steadily monitored to ensure compliance (Fanucchi, 2001).

## **2.7 Occupational Health Structures in various parts of the World**

### **Introduction**

It took many centuries for employers to accept full responsibility for the prevention of health hazards in industries. Several structures, including social and legal constraints, are being developed even today (Anderson, 2003). In developed countries, such as Great Britain and the United States of America, well established health services exist. However, in many developing countries, formal structures are still inadequate (Waarden, 2001).

### **Great Britain**

Increased attention has been placed on industrial health following World War II. Many industries appointed physicians with the sole purpose of promoting the health of the worker. The shortages of skilled labour had resulted in a sudden increase in working hours at many industries (Evans, 2001). This prompted a committee to be set up in England which examined the impact of long working hours in industries on the health of workers. However, this committee failed to address the problem. According to this committee, injury reports were likely to suffer from bias, with a more complete reporting from larger industries with a skilled occupational health team and medical infrastructure. The committee also reported that currently there is

inadequate data on the extent of hazardous exposure amongst employees (Singleton, 2003).

### **United States of America**

The Industrial Revolution began in the USA after it was well under way in Great Britain. Each state in the USA was allowed to adopt its own industrial health policy. The result today is that the United States Federal Government is unable to control the working conditions of workers as the standards of health vary from state to state (Schlosser, 2002).

### **Russia**

Medical professions did not prioritise the health and safety of workers following World War II (Evans, 2001) and health services in Russia are separated into therapeutic medicine and prophylactic medicine. Therapeutic services are provided by hospitals and prophylactic services are provided by sanitary and epidemiological stations in large plants (Singleton, 2003).

### **Republic of South Africa**

The development of industrial health services in South Africa is closely linked to the political and socio-economic status of the country (Searle, Brink, Grobbelaar, 1988). Prior to 1994 industrial health and safety evolved in the form of a number of laws governing the field. The Department of Health maintained a low profile in these services. The period after 1994 brought restructuring of health services within industries. This process of restructuring resulted in many proposals for the reform of occupational health and safety services to be brought forward. However, this has put increased pressure on labour resources. At present, health services are not yet

legally enforceable in many industries or areas where workers are at risk (RDP-Policy Framework, 1994).

## **2.8 Legislation**

### **Introduction**

The laws that deal with health and safety in South Africa attempt to achieve two goals. Firstly, to establish procedures, structures and standards that are aimed at protecting employees from injury and diseases at work. Secondly, to address the issue of compensation which comes into effect when protection fails and employees are injured or suffer from occupational diseases (Human Factors Society, 1993). Various laws have recently been promulgated to improve the health and safety of workers. These laws are outlined below.

### **Current Occupational Health and Safety (OHS) laws in South Africa**

Laws that govern OHS in South Africa have been revised to bring them in line with international norms and guidelines. These developments pose formidable challenges to health professionals responsible for the health of workers through workplace health services. The following Acts have been adapted from the Major Occupational Health and Safety Legislation website (2003).

### **Occupational Health and Safety Act (OHSA), 1993**

This Act is based on the principle of self-regulation that involves the agreement between employees and employers on the management of occupational health and safety in the workplace. This ensures a working environment that is without health and safety risks for employees.

**The most important aspects of the OHSA include:**

1. The need to have a healthy and safety policy
2. The appointment of health and safety committees and health and safety representatives
3. The undertaking of health and safety inspections, risk assessment and occupational hygiene monitoring
4. The conducting of medical surveillance by qualified practitioners
5. The mandatory reporting of occupational diseases by the occupational medical practitioner to the Chief Inspector
6. The continuing training of employees regarding the health and safety risks that they are exposed to
7. The outlawing of discrimination against workers found to have occupational injury or diseases as a result of medical surveillance
8. The major increases in the penalties a court can impose upon conviction of an industry where breach of the Act and regulations can be proved

**Compensation for Occupational Injuries and Disease Act (COIDA), 1993**

This Act governs the reporting and compensation for all injuries and occupational disease (excluding miners with occupational lung disease). It covers most groups of employees, except domestic employees who are excluded from obtaining benefits under this Act. The compensation system is administered by the state but funded by employer premiums. It provides for mandatory reporting of all occupational accidents or diseases to the office of the Compensation Commissioner.

**This ensures that the employee is able to claim for:**

1. Loss of earnings while temporary disabled

2. Medical expenses related to the occupational injury or disease
3. Compensation for any permanent disablement as a result of injury or diseases
4. Funeral expenses in the case of a death caused by an occupational injury or disease

#### **The Mine Health and Safety Act (MHSA), 1996**

This Act deals with prevention in mines and quarries and is similar to the OHSA in many respects. It entrenches for the first time the right of the worker to refuse to do dangerous work. The Act also requires that employees be issued with an exit medical certificate on leaving the mine. This certificate must clearly state whether the worker has an occupational disease.

#### **Occupational Diseases in Mines and Works Act (ODMWA), 1973**

This Act deals with certification and compensation for occupational lung diseases in the mining industry. Compensation is payable for two degrees of disability, namely, first and second degree. The Act also provides for compulsory postmortem examination of cardio-respiratory organs on deceased miners exposed to excessive dust conditions.

**Table 1:      Summary of current OHS Laws in South Africa**

<b>ACT</b>	<b>FUNCTION</b>	<b>DEPARTMENT</b>
Occupational Health and Safety Act (OHSA)	To ensure a healthy and safe environment in factories and offices	Department of Labour
Compensation for Occupational Injuries and Diseases Act (COIDA)	Provides for medical cover and compensation of occupational injuries or diseases in all workplaces	Department of Labour
Mine Health and Safety Act (MHSA)	To ensure a healthy and safe environment in mines and quarries	Department of Minerals and Energy
Occupational Diseases in Mines and Works Act (ODMWA)	Provides for compensation of occupational lung diseases in mines and quarries	Department of Health (Medical Bureau for occupational Diseases - MBOD)

## **2.9 Health Promotion and Education in Industry**

### **Introduction**

Health promotion and education programmes have received increased attention in industry, showing both positive health and cost benefits (Kenny, Powell, Reynolds-Lynch, 1995). When an injury occurs the entire industry is affected. Therefore the primary aim of any health and safety programme is to prevent injury and illness through education. Criteria should be established to identify specific training needs and scheduled training programmes should be implemented to address these needs. Only accurate and adequate knowledge of the risks associated with industrial work can empower the worker to identify hazardous working conditions. The leadership of the industry has a legal obligation to ensure safe working practices. Safety policies and awareness of health and safety principles must be implemented. This creates an active and positive co-operation amongst workers to accept responsibility for safety within the industry (Cronin, 1999).

### **Health Education Programmes**

In order to ensure accurate knowledge and training through health education programmes in a hazardous working environment, the industry must have the ability to identify gaps in its safety plan, develop strategies to improve safety, ensure compliance with the OHSA and its associated regulations and evaluate results to make safety improvements (Gale, 2000). To ensure a successful health education programme employers and workers must show a genuine willingness to accept responsibility for health and safety in the workplace (Gale, 2003). Together employers and workers must negotiate skills training programmes that are effective, efficient and convenient to meet the specific health and safety training requirements of the industry (Columbus, 2003).

According to Schwolsky (2003) a successful health education and injury prevention programme is dependant on four basic factors, namely, the leadership role of the employer, the health and safety practices of the workers, the compliance of the industry towards the OHSA and the safety of the working environment. Schwolsky (2003) further emphasises that the absence of any one of these four basic factors may contribute to an increase in workplace injuries, damage to property, loss of production time, loss of worker morale and even death.

Training procedures and policies must be developed to identify the specific needs of the industry and to stimulate awareness of safe working practices. Without the support of the employer and the co-operation of the workers a health education programme will fail (Jacobson, 2003). According to Norland (2003) the level of initial preparation will dictate the success of the presentation for the training programme. Success of any training programme is essential as training is expensive and trained consultants are accountable to ensure that the sessions are effective are not merely a waste of time and money (Simon, 1999). There are several key activities that are vital in the implementation of a successful health education programme. These activities are discussed below.

### **Relevance of the Education and Training Programme**

The education and training programme must be geared and updated towards health promotion and injury prevention (Cousens, 2000). To maintain safe working conditions all categories of the workforce must be included in the training programme. This includes workers who work full or part-time and/or day or night shifts (Columbus, 2003). The health and safety training of each worker must be evaluated in relation to their specific job description requirements and any other working arrangements such as shift work and flextime that may affect the health of



the workers (Rivenbark, 2000). Baseline criteria for the content of the education and training programme must then be established using the results of the evaluation and the relevance of the training programme must be maintained by ensuring its compliance with the OHSA rules and regulations (Cousens, 2000).

### **Methods of Communicating Health Education to Workers**

The communicating of health information to workers may take several forms. These include informal group discussions, general safety education workshops, specific in-service training and the development of appropriate training materials for the various targeted groups (Cronin, 1999). A simple description of safe working practices and health-related issues are not sufficient to ensure safety in the workplace (Rivenbark, 2004). According to Cronin (1999) procedures need to be demonstrated and practised during training sessions. Workers must show competency before being allowed to assume duty. In this regard, the employer has an important role in communicating safe working practices through example setting and acknowledging the safety achievements of workers (Crim, 2003).

### **Evaluation and Enforcement of Health and Safety Principles**

On completion of the health education and training programme a thorough evaluation examining the efficacy of the programme must be established. Supervisory reports in conjunction with a management follow-up plan are essential in ensuring the continual surveillance of workers (Ackles, 2003). Communication channels linking the feedback from workers on issues of health and safety and employers must be implemented to contribute to the overall productivity of the industry (Cronin, 1999). Disciplinary measures must be enforced on workers who break the safety rules. These measures must be applied carefully and only by those with the authority to do so (Walker, 2001).

### **Role of the Employer**

The employer must have a positive attitude and a genuine interest in health and safety. The supervisor has an increased responsibility in ensuring that health promotion and injury prevention programmes are adequately enforced (McMahan et al., 2001). To promote safe working conditions senior management must establish safety policies and procedures that are relevant to the industry concerned. These policies and procedures must guide the worker to healthy working practices. The policies and procedures form a framework on which senior management has a legal responsibility to ensure that workers are provided with a safe and healthy working environment (Myshko, 2002).

### **Health and Safety of the Industrial Health Care Worker**

Industrial health and safety personnel are exposed to a variety of occupational hazards in the workplace with the safety and protection of health care workers often being disregarded (Adams, 2003). With their increased knowledge of safety practices, prevention of injury and disease control, health care workers are considered safe from harm (McMahan et al., 2001). The potential health hazards in the industrial sector are numerous and varied. These include exposure to infectious diseases, injuries, musculoskeletal problems and increased stress levels (Walker, 2001). The literature suggests that many industries do not give sufficient attention to the health and safety needs of health care worker and that that medical and nursing staff must be monitored on a regular basis, especially when health personnel are exposed to special hazards such as radiation and carcinogens (Masha, 2002; Biderman, 2002).

There are some extensive documents on the risks that are faced by health care workers. These documents also offer guidelines, recommendations and ergonomic

plans on safety procedures to minimise these risks (Henshaw, 2002; Hopps, 2000; Raflo, 2000). For industries to meet the international norms of health and safety special consideration must be given to health care workers (Walker, 2001). Studies (Donald, 2000; Phillips, 2002) have shown that improving working conditions, hours of work and implementing specific measures for the prevention of stress and burnout of health care workers has directly impacted on improved health services within industries. Elvin (2000) proposed introducing stress counselling and support group programmes to help medical and other health related workers to cope with the strains of the job.

### **Costs of Training Programmes**

The extensive costs associated with adequate training have been highlighted by several authors. Starner (2003) suggested that preparation time, which may take several hours to research, study, organise, write and accumulate support materials can assume between 2 to 4 hours a day at a cost of R30 per hour. For proper training materials and a suitable location facility Grover (2003) suggested R20 per attendee for materials paid upfront and R1 500 for the room, audio-visual equipment and refreshments. Mangan (2003) suggests that since workers are responsible for a certain portion of the production load and may fall behind in that capacity due to attendance of the training programme, an assumption of R20 per worker per hour of class time is needed to cover the expense of lost production time, wages and benefits. Nash and Quinn (2004) believe that accurate record keeping must be maintained to demonstrate the completion of the training and to provide the necessary liability protection for the industry. Nash and Quinn (2004) further speculate that at least four hours of labour per month is required to maintain these records.

The estimated budget above is thought to be conservative considering the 40 mandatory training requirements for OSHA, initial worker orientations and regular preventative training sessions (Fister, 2003). Martin (2002) believes that senior management must be prepared to dedicate a corporate priority to health and safety training to reduce and/or eliminate injuries in the workplace and achieve a moral responsibility at the same time.

## **2.10 Injury Prevention and Management**

### **Introduction**

Industrial injury prevention and management programmes that facilitate the return to work of injured workers have grown since the 1980s. These programs include early identification and treatment, regular surveillance of the work-site and accurate record keeping (OSHA, 1990). Reaching the goal of preventing industrial injuries requires a combined effort from all team members to best implement education, training and work-site evaluation (Pheasant, 1991). By the end of the training programme workers should be able to identify early symptoms of job stressors and understand the necessity of proper working methods (OSHA, 1995).

Industrial physiotherapists experienced in the evaluation and treatment of industrial injuries are an essential component of returning workers to the workplace. The focus of rehabilitation is not only to improve motor and sensory function but also to include external factors such as work and home modifications (Dunn, 2003). The emphasis of industrial rehabilitation now requires a multidisciplinary team approach for return-to-work programs to be successful and in reducing the overall health care costs (Mayne and Sawyer, 1994).

The rapid advances in rehabilitation have expanded the role of industrial health care

workers. Interdisciplinary teams need to provide services that promote optimal human performance for workers (Wyman, 1999). The continued development of rehabilitation will play an important part in making the workplace more user-friendly for all populations (Inkeles, 1994).

To promote injury prevention strategies at the workplace several factors must be taken into consideration. These factors are discussed below.

### **Understanding the Nature of the Task**

Prior to performing any task the worker must understand the risks and hazards associated with the activity. Any task has risks and benefits but inadequate knowledge may lead to the worker failing to recognise the risks associated with the activity (Barach and Small, 2000).

### **Ability of the Worker**

The worker must have the required skill and knowledge to perform a task competently. Insufficient skills contribute to injuries in the workplace (Rolnick, 2000). Special attention must be given to special populations of the workforce. These include the physically challenged and older workers (Abdel-Moty and Khalil, 1989). According to Vopak (2001) impaired hearing, vision, mobility and reaction time are some of the factors that may affect work performance.

### **Physical and Psychological State of the Worker**

As discussed previously, the physical and psychological state of a worker can affect work performance (Shiers, 2004). Physical exhaustion and boredom can result in a worker acting recklessly (Shepherd, Sivarajasingam, Rivara, 2000). According to Spath (2003) alcohol abuse and social problems may disrupt the normal behaviour

patterns of workers that contribute to negative emotional states resulting in unsafe working habits.

### **Identifying Training needs of the Worker in the Practical Situation**

A successful injury prevention and health promotion programme in the workplace can only be achieved by identifying the specific training needs of the workers. This includes a thorough examination of the working practices and workplace layout of each worker (O'Toole, 2003). Several studies (Cadrain, 2002; Diomedes, 2004; Hall, 2003) have shown that by applying the basic health and safety principles in a systematic and logical manner injury can be prevented through increased worker morale, productivity and quality of work.

Workers must be encouraged to evaluate their own workplaces and identify needs that could benefit both the worker and the industry as planning effective training programme is both time consuming and expensive (Forjuoh and Guyer, 2001). To meet the needs of the worker, industries with health and safety policies already in existence must ensure that these policies are updated according to international standards of safety. Neglecting aspects of health and safety could result in management making wrong decisions which in turn could compromise the safety of the worker with sometimes severe consequences (Berwick and Leape, 1999). According to Bronner (2003) a thorough investigation of all safety challenges in the workplace must be comprehensively assessed to avoid concentration on only one aspect.

To implement and sustain a successful injury prevention and health promotion programme certain key elements are essential. These include active participation of all workers, long-term commitment by management and a positive attitude of all

relevant stakeholders remain as the most important factors (Ishmael, 2004). A document containing the procedure of implementing the proposed programme in the industry must be compiled. This document must be approved by management and a policy formulated. Budget constraints, personnel resources, workplace limitations and individual inputs must be scrutinized during the process of formulating the policy (Marriott, 2002). Management has a crucial role of ensuring that all level of workers are orientated on the new training policy by initiating an in-service programme. This programme should be part of the vision and mission of every industry (Mazella-Ebstein, 2004).

### **Commentary**

Expert management is essential for the training programmes to be successful. The training team must demonstrate that the benefits of the programme are greater than the costs to the industry. If management issues are ignored then training programmes are likely to fail (Michigan Corporate Programmes, 1994). The integration of available resources and health care personnel are necessary to create the elements of a comprehensive programme necessary for injury prevention within the working environment (Dunn, 2003).

## **2.11 Occupational Health Team**

### **Introduction**

The members of the occupational health team contribute with unique skills regarding the assessment and implementation of the health and safety programme (Gourley, 2001). To be effective, the health promotion programme requires a multidisciplinary team effort. Related disciplines need to liaise with each other to ensure that patient goals are constantly considered, implemented and re-evaluated to guarantee the highest quality of patient care. Alternate treatment approaches must be considered to

ensure that treatment modifications implemented best serves the needs of the workers and the industry (Mandile, 2003). Many health care professionals have expanded their practice to include industrial settings. The extent of interest is reflected with the increase of articles specifically focusing on ergonomics in professional journals (Bogner, 1996a). Highlighted below are some of the team members that contribute significantly to employee care.

### **Occupational Health Physician**

The occupational health physician is concerned mainly with the causal relationship between work and worker health (Gardner and Taylor, 1975). This branch of medicine deals with the prevention and management of occupational injury, illness and disability (Wesdock and Sokas, 2000). The objective is to protect the worker against hazards in the working environment and the treatment of emergency conditions sustained during working hours (Currer and Stacey, 1986).

### **Occupational Health Nurse**

The occupational health nurse (OHN) is an important, equal and integral part of the team (Brown, 1981). The role of the OHN is concerned with the prevention of illness, promotion of health and on curative aspects of health care (Baker and Coetzee, 1983). This role may vary from simple tasks to clinically advanced operational tasks (Hickey, 2003).

### **Industrial Hygienist**

The industrial hygienist deals with the recognition, evaluation and control of those environmental factors which arise in the workplace, resulting in disease, injury and inefficiency amongst workers (American Industrial Hygiene Association, 1959). Industrial hygiene is an applied science encompassing the application of information



from various other sciences, including physics, chemistry, biology, mathematics, medicine and toxicology (Cralley and Cralley, 1985).

### **Industrial Ergonomist**

An ergonomist employs techniques to match the specific needs of a given pursuit to the functional capabilities of the individual worker (McQuistion, 1993). Ergonomists may apply their specialised skills to groups of current or potential workers for broad implementation or to specific individuals with special needs (McLean, 2001). Industrial ergonomists may sometimes be referred to as *rehabilitation engineers*, *rehabilitation technologists*, or *assistive technologists* (Odenwald, 1995).

### **Industrial Psychologist**

The industrial psychologist deals with mental health problems of individuals which arise in organisations (Baker and Coetzee, 1983). The needs of the individual are closely examined to ensure a high level of motivation and productivity (Rowh, 2002).

### **Rehabilitation**

Physical, occupational and speech therapists play critical roles in the rehabilitation of persons with acute or chronic injuries and illnesses (Mayne and Sawyer, 1994). The basic goals of industrial rehabilitation are to enhance the functional independence of workers and to facilitate the successful return to the working environment (Ezarik, 2004). This section will cover the role of the industrial physiotherapist, industrial occupational therapist and industrial speech-language pathologists.

### **Industrial Physiotherapist**

The role of the industrial physiotherapist is to prevent injury, enhance movement and increase function amongst the workforce (Ishernhagen, 1991). However, a more

recent role of an industrial physiotherapist includes the determination of fitness requirements for specific jobs and performance abilities based on specific job demands (Kenny et al., 1995). According to Ishernhagen (1988) a parallel role exists amongst industrial physiotherapists and industrial occupational therapists. The industrial physiotherapist works with the worker until *returning home is possible*, and the industrial occupational therapist works with the worker until the *return to work is complete*.

### **Industrial Occupational Therapist**

The fundamental role of an industrial occupational therapist is to enhance the functional capacity of the worker throughout their lifespan to ensure productive living (Hopkins, 1978). According to the American Occupational Therapy Association (AOTA, 1994) the fundamental goals of occupational therapy are to maximize independence, prevent disability and maintain health. These goals vary with the every worker. Options include returning the worker to the same job, returning the worker to the same job with modifications, finding an alternate job using the skills of the worker or retraining the worker for a new occupation (Gourley, 2002).

### **Industrial Speech-Language Pathologists**

The role of an industrial speech-language pathologist is to provide education and training for disorders of communication and their valuable role in planning injury prevention programmes within the multidisciplinary team has been well recognised (Sanger, Brown, Montgomery, Hellerich, 2004). Speech-language pathologists initially assess workers in their primary language and then in their spoken language. This baseline assessment may sometimes require the assistance of an interpreter (Langdon and Quintanar, 2003). It is essential for speech-language pathologists to know how to effectively work with an interpreter to ensure that the initial assessment

is both valid and reliable for evaluating speech outcomes in clinical practice (Brian, Brian, Packman, Onslow, 2003). The management of workers with communication disorders must involve positive support by the speech-language pathologist and include interventions such as functional communication and alternative communication training (Bopp, Brown, Mirenda, 2004). Compensatory and other therapeutic procedures may then be implemented to improve oropharyngeal function (Logemann, 1988).

### **Commentary**

Rehabilitation professionals have a fundamental role in the management of workplace injuries. To effectively make clinical decisions in everyday practice, information from scientific literature must be considered and encouraged to guide the therapist (Pain et al., 2004).

## **2.12 Management of Occupational Injuries**

### **Industrial Management:**

#### **Introduction**

The workplace has become more specialised and many industries have increased output demands (Clarke, 1997). The demographics of the workforce have also changed and this has placed further stress within the working environment. The most critical element in ensuring safety in the working environment is the commitment of the industry to injury prevention (Bernhardt and Bailey, 1998). The industry must be able to communicate and demonstrate the benefits of safe working practices in order to gain the necessary support and co-operation of the workers. Accurate records of injuries sustained at the workplace must be well documented to serve as a baseline for monitoring the effectiveness of injury prevention programmes (Hartshorn, 2003).

### **Worker Surveys**

Worker surveys are important in order to gather relevant information regarding perceptions of discomfort, sources of discomfort and identification of problems that otherwise might go unreported (ANSI, 1996). The surveys implemented should suit the specific safety needs of the industry. Surveys should be conducted periodically to continuously supervise and monitor the health status of workers (Orland, 2003).

### **Supervisor Monitoring**

The role of the supervisor has been identified as one of the most important in the workplace (Humphrey and Strokes, 2000). The supervisor must monitor the work area by assessing for potential hazards that could result in injuries. It is also necessary for the supervisor to reassess the working area after a significant change to the working process has occurred (Valentine, 2001). Workers must be routinely evaluated in order to determine whether a problem exists and the extent of the problem (Frings, 2003).

### **Problem Determination**

The supervisor must determine whether a problem exists or not. If it is concluded that a problem does exist, then the severity and triggering agent must be identified. This identification will serve as a baseline that would guide further assessments and interventions (Schulman, 2002). A single worker with a problem requires a case management, as compared to an area-wide problem that requires a team effort to resolve existing problems and to identify, recommend and implement workplace changes to prevent the occurrence of future problems (Grandjean, 1988).

### **Prioritization**

A number of factors must be considered when prioritizing problems for assessment and intervention. These include the number of workers affected, costs, incidence rates and case severity (Garavalia, 2002). High-risk tasks must be targeted to receive priority consideration. The assessment can then focus easily on these tasks (Brogan, 1996).

4

### **Assessment Method and Analysis**

Once the problem areas have been identified and prioritized, an extensive assessment of the work environment must be conducted. The assessment should focus on specific factors, including basic risk factors such as awkward postures, repetition, duration and recovery time, mechanical compression, vibration, force and temperature extremes (Shaw, 2001). Acceleration and velocity of dynamic motions have also been identified as risk factors (Marras and Schoenmarklin, 1991). The problems identified must then be analysed to determine whether there is a single risk factor or a combination of risk factors (Lee et al., 2003).

### **Enforcement of Health and Safety Principles**

On completion of the assessment and analysis, an awareness process must begin to inform workers of the hazards present in the working environment and to enforce the requisite precautions to reduce or eliminate these hazards (Murano, 2003). A strategically co-ordinated meeting must be conducted to disseminate relevant information to workers. Supervisors must monitor and enforce compliance adequately to ensure that all provisions for health and safety in the workplace are met (Conroy and Stichter, 2003). Workers that are injured-on-duty must be referred to the relevant medical personnel for further management (Powers et al., 2001).

Arfa (2003) suggests that following injury or disease in the workplace, the designated workers must consult a physician within the first 20 minutes and must be referred to and seen by a specialist within 24 hours, if necessary. Emergencies and repeatedly injured workers must receive special management attention and close contact must be maintained with these injured workers and their doctors to reduce lost days, medical costs and minimise the costs of future cases (Macumber, 2003).

## **Medical Management:**

### **Introduction**

Medical management includes relevant evaluation criteria documented according to medical evaluation findings, diagnosis, treatment plan, return-to-work plan, light duty restrictions and results communication with employer (Schwartz, 1997). Follow-up evaluation findings and any treatment plan modifications should also be documented (Grant, 1995).

### **Medical Surveillance**

Medical surveillance is designed to detect early adverse health effects associated with certain work duties which includes exposure to occupational hazards (Harber, McCunney, Monosson, 1994) and to address these adverse health effects by analyzing the health information in order to identify workplace problems that require targeted prevention (Wesdock and Sokas, 2000). Medical surveillance involves both a hazard assessment and an employee eligibility determination.

For the health assessment the physician assesses the biomechanical, biological and chemical hazards to which the worker may be exposed and have the potential to cause adverse health consequences. For the employee eligibility determination the physician together with the employer must evaluate the health assessment findings

of all workers and assign them into high-risk and low-risk categories (Winter, Bovbjerg, Miller, Shapiro, 2001).

### **Medical Screening**

Medical screening involves the detection of dysfunction or disease before a worker would ordinarily seek medical care (Wesdock and Sokas, 2000). Medical screening involves an initial examination which includes a medical and occupational history and a physical examination of the musculoskeletal, respiratory and nervous systems (McCunney, 2001). Physical examinations should only be given after employment has been made and workers assigned to high risk jobs should receive periodic physical examinations every 2 to 3 years (Schneid, 1992).

### **Medical Treatment**

The medical management involves both invasive and noninvasive procedures. This includes urgent care treatment and prevention services such as medical surveillance programmes, pre-placement physicals, drug and alcohol testing, anti-inflammatory medication, injection and surgery and therapy and splinting referrals (Hingham, 1998). Occupational health physicians have a legal obligation (Reuse, 2003) to ensure that their decisions on treatment regimens, time-off work and restricted duty for injured and ill workers are accurate and supplied in a timely manner to the employer to initiate a quicker return-to-work process (Jackson, 2003).

### **Return-to-Work Plan**

The role of the physician is instrumental in the process of returning a patient to the workplace after an injury or illness (Wyman, 1999). The physician must have an adequate knowledge of the workers' specific job requirements and limitations in order to identify work restrictions, time frames, necessary accommodation and job

assignment tasks that may prolong the re-entry into the working environment (Grasso and Rousmaniere, 2002). After assessing the functional capacity evaluation and consulting with other occupational health staff the physician must determine whether the worker is fit to re-enter the working environment and that suitable job modifications are made to reduce or eliminate exposure to any risk factors (Kelley, 2000). These include reducing thermal exposure time, decreasing work pace, eliminating hazardous elements of the work environment and providing assistive devices or retraining (Toran, 2003). Complete removal from the working environment should be the last resort and avoided if possible (Doyle, Shepard, LaFleur, 1993).

### **Communication with Employer**

The physician is responsible for communicating the assessment findings and treatment plan to the employer (Wyman, 1999; Schwartz, 1997). This plan should outline the results of the assessment, an overview of the proposed treatment plan, any specific work restrictions, the duration of these restrictions, necessary modifications to the working environment and re-assignment recommendations (Mott, 1999). This plan should include only relevant information and workers have the right to restrict the disclosure of any health information to the employer. Failure to restrict the disclosure of health information may result in criminal and/or civil sanctions for the improper use or disclosure of medical records (Atkinson, 2001).

### **Follow-Up**

The physician must ensure that regular contact is made to the employer during the recovery period to avoid accusations of negligence. This contact can take the form of voluntary reporting or mandatory reporting (Studdert and Brennan, 2001). The worker must be routinely monitored to ensure that work modifications and safety objectives are effective in reducing or eliminating risk factors (Morreim, 2001). Periodic medical



re-assessments are necessary to determine the response to treatment, the current status of the condition and to identify any additional workplace modifications. (Rubenstein, Sternbach, Pollack, 1999).

Thereafter a final evaluation following the completion of treatment should be performed by the attending physician and compared to the findings of the initial baseline assessment. The results of the final assessment must be documented and maintained in confidential files and made available only to the worker, medical personnel and personnel handling compensation claims (Grant, 1995). Employers will be required to get written authorisations from workers for every single disclosure of personal health-related information and provide explanations of how the information may be used (Atkinson, 2001).

### **Physiotherapy Management:**

#### **Introduction**

Physiotherapists have a critical role in the management of industrial injuries. This includes a range of services and expertise in assisting workers to successfully return to the workplace (Rosenheck, Stolar, Fontana, 2000). Critical to the success of any rehabilitation programme is the motivation and willingness of the worker to succeed and the support of the employer to accommodate a worker with an injury (Kuipers and Quinn, 2003). In terms of the OHSA and COIDA all injuries sustained at the workplace must be reported to the supervisor before the end of the shift on which the injury occurred as evidence will be required from the worker should the injury not be reported during the shift on which the injury occurred (Jacobson, 2003). Physiotherapists need to align their rehabilitation programme to help the worker participate in the goal determination process and become more proactive in returning to the workplace (Thompson, 2003).

### **Aims of Physiotherapy Management**

The main aim of physiotherapy is to focus on the specific needs of the individual worker and the associated social, economic, vocational and cultural implications that may affect the worker, as well as the impact on family, friends and the community (Corso, 1984). The rehabilitation process involves helping the worker to regain both physical and mental capabilities needed for both work and leisure roles (Fay, 2003). Since industrial injuries have different clinical presentations a medically based functional assessment prior to physiotherapeutic intervention is important. The results of this assessment in conjunction with the prognosis and possible side effects of the injury form a baseline to treatment and subsequent assessments monitor progress and may help with modifications to the treatment approach (Loughney and Harrison, 1998).

### **Goals of Physiotherapy Management**

The goals of physiotherapy should not be viewed as separate entities as all problems are interrelated. The physiotherapist must consider the health issues of the worker, functional status and working environment in order to begin the process of establishing short-term, intermediate and long-term goals (Hillemeier, Lynch, Harper, Casper, 2003). From a health care perspective, health promotion and injury prevention programs must be implemented to provide a holistic approach to the constantly changing working environment (Jacobs and Bettencourt, 1995).

A physiotherapeutic clinical examination involves a four-step process. This process includes an evaluation, intervention, re-evaluation and analysis. At each step of the process professional practices must be applied and expected outcomes determined (Mandile, 2003). This process is discussed below.

### **Step 1: Evaluation**

In this first step, the worker is evaluated in accordance with the standard operating procedure for injury. The physical, mental and social status of the worker are assessed using standardized testing together with the identification of functional limitations, contra-indications to intervention and potential to improve (Tolar, 2003). A medically based functional capacity evaluation may be conducted in conjunction with the industrial occupational therapist to determine the ability of the worker to conduct activities of daily living, work tasks and leisure pursuits. This information is compared with the specific requirements of their work, leisure and home environment (Hillemeier et al., 2003). If the rehabilitation process is expected to be long-term or certain limitations are expected to be permanent, then further evaluation of the work and home environment may be required (Hodge, 2003). The main focus of the evaluation is the worker. The environment of the worker is only evaluated if the consequences of the injury justify such an evaluation (Hillemeier et al., 2003).

### **Step 2: Intervention**

The intervention process includes specific patient treatment based on the nature of the injury, subsequent disability and functional capabilities. The majority of patient treatment is therapeutic in nature, using techniques such as graded muscle strengthening, focused physical exercise, splinting, cognitive retraining and physical modalities such as ultrasound and heat (Wilson and Corlett, 1990). The treatment regime is tailored to suit the individual needs of the worker and gradually increases in accordance with the demands of work that the worker has to eventually resume (Hillemeier et al., 2003). Intervention also includes the alteration of the work environment and the restructuring of the home environment for those with long-term or chronic disabilities. Changes are gradual and may become permanent if the worker has achieved the highest functional level (Fay, 2003).

### **Step 3: Re-Evaluation**

Throughout the intervention process, re-evaluation occurs on a periodic basis. Baseline values are established during the initial evaluation. Subsequent re-evaluation values are compared against these baseline values to monitor the progress of the worker. These values are of importance in the goal setting process (Rubenstein et al., 1999). Re-evaluation includes physical measures of strength, coordination, range of movement (ROM) and task performance measures such as level of independence during activities of daily living (Rice, 1995b).

### **Step 4: Analysis**

During analysis, all significant values are analysed to identify the strengths and weaknesses of the physiotherapeutic management. The analysis is only effective if the information gathered is thorough to identify problems and solutions. According to the Board of Certification in Professional Ergonomics (1996) analysis can include mission analysis, functional analysis and task/job analysis.

Mission analysis involves defining specific objectives and resources available to achieve the objective. Functional analysis involves identifying the capabilities of the worker and any implications for intervention. During task analysis, the psychological and physical abilities necessary for task performance are identified. The procedures and equipment used in achieving the tasks are also identified (Stammers, Carey, Astley, 1990).

All information gained during the analysis phase is used to assess the adequacy of the evaluation, intervention and re-evaluation processes. Professional judgements are made and areas of practice are applied to the specific needs of the worker (McCall and Salama, 1999). Thus begins the process of transformation in which

information can be integrated to achieve the goals of enhancing worker performance, promoting health and preventing injury (Hodge, 2003).

## **2.13 Issues of Methodology**

### **Methodology used in Related Studies**

Although the literature search has revealed numerous related studies addressing occupational injuries, there have been limited studies that examined the injury patterns of alcohol manufacturing environments. The studies below have been selected on the grounds of the sample selection, methods of data collection (interviews, retrospective records review and observation) and the advantages and disadvantages of each. These studies are presented below.

A study in France by Deschamps et al., (2003) that evaluated the levels of occupational stress amongst policemen was obtained using a self-administered questionnaire. This questionnaire examined demographic, occupational and health characteristics using a stress level assessment scale. The sample was drawn from a large metropolitan police force extending from the first line policeman to top senior management.

A study by Lee et al., (2003) on predicting burnout factors of nurses in Suh-Gu, South Korea was obtained using a cross-sectional correlation design. The data was collected using self-rating questionnaires and analysed using hierarchical multiple regression. The sample for this study did not indicate the category of nurses selected i.e. general nurses, occupational health nurses and/or midwives. The working environment i.e. hospital, industry and/or private sector, in which this study was conducted was also not mentioned.

A study by Jamison et al., (2004) examined the relationship between the characteristics of the work environment and ill-health. This study was conducted in Bloomington, Indiana at a paper and board manufacturing industry. The data for this study was obtained via a telephonic interview and the responses of participants were marked against a structured checklist that was designed to obtain the socio-demographic, lifestyle and job characteristics of these workers. The problem with obtaining data using a telephonic interview technique is that the process of establishing a relationship of trust with the workers is reduced. Workers who are do not want to continue with the interview may terminate the call by putting the receiver down and so there is little opportunity for the researcher to motivate for the importance of the study. In this case the checklist may be regarded as a *forced-choice checklist* as participants must make a choice between aspects that may not necessarily correlate against each other (Bailey, 1994).

A study by Fullerton et al., (1995) on occupational injury in New Mexico was aimed at examining the specific risks of occupational injury. A retrospective design was used to review state medical reports over a 10-year period with regard to the type of industry, gender, ethnicity, location and alcohol and other drug involvement.

A study in Taiwan by Lee, Shiao and Guo (1998) examined the awareness and compliance of employees' with health and safety regulations at a bottling manufacturing industry. The sample consisted of a total of 103 workers that were interviewed by trained occupational health personnel. Ten questions were asked related to perceptions of general OHS and five questions on practices of health and safety regulations. This study is limited in that there is no surveillance of participants in their natural occupational settings with regards to the practices of health and safety regulations. Participants may easily indicate during the interview that they are

compliance to health and safety protocols to avoid the possibility of sanctions being imposed on them by management.

It is clear that although several studies have addressed injury and the knowledge of workers of health and safety practices at the workplace, no studies have systematically determined the physical, psychological, sociological and environmental variables that are associated with injury. The poor research designs and limited measuring instruments used in some of these studies do not address the multivariate factors of injury.

### **Use of Questionnaire**

Several instruments have been developed to investigate the factors that contribute to injury within the working environment (Adkins, Youngbauer, Mark-Mathews, 2000; Hennessy et al., 1994; Rousmaniere, 2001). Although these instruments have been used widely by occupational health professionals (Dimberg et al., 2002), they do not include specific enough questions to systematically measure the demographic, physical, psychological, sociological and environmental variables usually reported by workers injured-on-duty.

There are several advantages of using a questionnaire as a measuring instrument. It is a less expensive means of gathering data and a large number of subjects can be involved. However, the disadvantage of using questionnaires is that the non-response rate may be high and missing data is common (McMurtry, 1993). The questionnaire may include both closed and open ended questions. Closed ended questions allows the respondent to understand the meaning of the questions better, to allow for quicker and easier answering, more questions could be asked by the researcher, little writing is required from the participants and it is easier to manage

statistically (Schuerman, 1983). Open ended questions allow s the respondents to elaborate and clarify their answers and personal views of participants could be explained to give the researcher more insight of the answers (Black and Champion, 1979). The advantage of hand delivered and group administered questionnaires is that much time and cost is saved and that a group of respondents are handled simultaneously and consequently also exposed to the same researcher (DeVos, 1998).

### **Use of Observation as a Data Collection Tool**

The use of observation as a data collection tool producers a relatively detailed picture of a particular phenomenon in the natural setting. This technique of observing the behaviour of workers in their actual work environment allows the researcher a much more detailed understanding of their behaviour (Fraenkel and Wallen, 1993). However, some authors argue that observation is very laborious and time-consuming (Ackroyd and Hughes, 1981). Jorgenson (1989) believes that researchers should visit and preferably spend considerable time in the participant's natural setting to obtain reliable data on how their subjects' go about their everyday work routine. It is important to note that since participant observation is highly dependant on the observation of the researcher who executed the study, such researchers must not in any way influence or affect the group under study by variation of their roles during the observation (Denzin, 1989).

According to Chadwick, Bahr and Albrecht (1984) participants under observation that are completely unaware of being observed may be ethically questionable. But to minimise the Hawthorne effect, participants may be informed that their behavioural pattern will be observed for the purpose of the study but not informed of the actual observation dates and times to avoid more attention being induced to make a greater



effort (Abdellah and Levine, 1979). Bottorff (1994) recommends that strategies to maintain confidentiality by not identifying any observed participant by name is crucial to reducing the risk of harm related to embarrassment, administrative or legal punishment of those studied.

#### **2.14 Conclusion**

The review of literature has revealed that injuries in the workplace have impacted significantly on the functional capabilities of workers. Injuries are a major problem in South Africa. The implementation of health and safety training is costly to both workers and management which are important components of injury prevention. It is becoming increasingly clear that there is a multiplicity of work-related risk factors (Hagberg, Silverstein, Wells, 1995). However, available literature from a South African perspective is seriously lacking. It is now imperative that a systematic approach to reduce or eliminate work-related factors be implemented to ensure the long-term success of any health promotion and injury prevention interventions (McMahan et al., 2001).

It is also important to take into account the unique characteristics of any industry under investigation (i.e. history, organizational climate and culture, labour-management relations, technology, experience with organizational change) when appraising the literature (Manolakas, 2004) and to understand that the results and conclusions drawn from these studies cannot necessarily be extrapolated to all types of industries. It is with this view that the author attempts to close the gap that exists between scholarly research and what Argyris (1993) calls salable knowledge by not only addressing the multivariate factors that contribute to work-related injury, but also ensuring that the health and safety principles designed and implemented for the specific beverage manufacturing industry under investigation are suitable and

practical in guiding this industry to improving its health and safety status. It is clear that the above literature supports the fact that the knowledge of injury patterns and the involvement of workers in health promotion are important factors that must be addressed and therefore the researcher is conducting this study.

### **3. METHODOLOGY**

#### **3.1 Research Design**

Different quantitative research designs were used to gather data on the three phases of the study. A descriptive and cross-sectional design was used to ascertain the knowledge of workers regarding health and safety (Phase 1). An observational design was used to ascertain the health and safety practices of workers (Phase 2) and a retrospective component was included to document the injury pattern of workers that reported to the occupational health clinic over a six-month study period from July 2004-December 2004 (Phase 3).

The descriptive design was chosen as it permits reasonably precise information and judgement (Burns and Grove, 1987). A cross-sectional survey was used as it is less expensive, external influences are limited and loss of participants is minimised (Treece and Treece, 1986).

The observational aspect of this study was conducted over two days during a two-week period. This structured observational design allowed the researcher to carry out the observation according to a predetermined schedule and record only relevant aspects pertaining to the study (Verhonick and Seaman, 1988).

The retrospective design was chosen because it related existing phenomena to other phenomena that has occurred in the past allowing the study to be more manageable (Polit and Hungler, 1987). A quantitative approach in the form of a semi-structured questionnaire, a checklist and an injury data spreadsheet was used to address the health and safety knowledge, practices and injury patterns at

this specific company. The quantitative design permitted accurate analytic operations of data (Fox, 1986).

### **3.2 Research Setting**

The research setting was a specific beverage manufacturing company within the greater Durban area. This company consists of several sites involving the production and storage of alcoholic beverages. This specific company was chosen because it is reflective of several manufacturing companies worldwide and at the time of the study employed 327 workers making this study feasible. This specific company consists of seven permanent departments and four contractual departments. The seven permanent departments include the plant box, administration, workshop, health services, waste, risk control and stores. The four contractual departments (which have a 3-year renewable lease) include laundry, catering, mail holding and forwarding services and technical services (i.e. electrical services, carpentry services, air conditioning services).

To understand the extent to which this company follows the Occupational Health and Safety Act, it is important to describe the stages of production, the medical services and the medical personnel. Below is a detailed description adapted from the occupational health, safety and risk control manual of how this specific company manages occupation health and safety.

#### **Stages of Production**

The stages of production of the alcoholic beverage at this specific manufacturing company begin when the raw material is delivered to the company. The raw material is stored until it is ready for the brewing process. The raw material is

then placed into the wort boiler and selected yeast is added initiating the fermentation process. During the fermentation process the yeast is regulated under controlled temperatures. When the temperature reaches optimal level the yeast is converted into alcohol and carbon dioxide. The newly produced alcohol is then transferred and stored in colder storage vessels. Here the alcohol is filtered and transferred into larger tanks. Once the alcohol is cooled it is pasteurised and then packed into bottles and cans. The bottles and cans are labeled and the final products are then transported to various outlets for sale. All alcohol beverages that do not ferment fully are transported via hysters to the waste department where it is disposed of.

### **Medical Centre**

The occupational health clinic is situated within the medical centre and is concerned with staff-related health matters. The medical centre consists of one full-time company doctor, four occupational health nurses and a medical service co-ordinator. Two types of healthcare are provided, namely, primary health and occupational health. The primary healthcare facet provides workers who are not members of a medical aid plan with basic healthcare and advice. This healthcare includes the provision of a single course of medication if required or referral to a provincial hospital for an injury or disease that require more advanced or continued care.

The medical service co-ordinator is responsible for the implementation and control of the occupational health facet. The aims are to identify those processes, chemical substances or types of work that could negatively impact on a workers' health and to eliminate, minimise or control the hazard. The occupational health

programme at this company is compliant with the extent of the Occupation Health and Safety Act of 1993 that requires occupational health risk areas, jobs, processes, hazardous substances etc., to be identified, assessed, quantified and appropriate measures to be developed and implemented. The identification and assessment of occupational health risks are carried out via the Risk Management Programme (RMP). Consultants are used from time to time to assess the risk or to assist the company in setting up the methodology so that occupational health personnel can carry out the necessary tasks to assess the injury.

#### **Medical Centre Hours**

The medical centre is open 24 hours a day, seven days a week. In the event of an onsite emergency where medical assistance is required, an internal telephone number is available.

### **3.3 Sample**

This study consisted of three sample groups chosen from a specific beverage manufacturing company situated in the greater Durban area. The first sample included all workers from all departments to provide a broad overview perspective of the knowledge of health and safety at this specific beverage company. This sample included general workers, administrative staff, technical staff and managerial staff. The first sample group consisted of 327 workers that were required to complete a questionnaire on health and safety practices within this specific company. A sample of convenience was used in that all workers who are present for work at the time of the study were included.

The second group was the sample for observation during working hours. A sample of convenience was used in that every worker who was present on those days was included. The third group included all workers that reported to the occupational health clinic with occupational injuries during the six-month study period.

### **Inclusion Criteria**

All levels of workers i.e. from the most senior to the most junior were included in this study. Workers were chosen regardless of age, gender, work experience or race.

### **Exclusion Criteria**

For the section on injury data analysis the following groups of workers were excluded:

- (a) Those who were injured outside the working environment, and/or those who were injured at work but have only sought treatment elsewhere.
- (b) Those who reported injuries outside the working environment.
- (c) Those with medical conditions pre-dating their employment at the company. These conditions include but are not limited to ankylosing spondylitis, cervical spondylosis, lumbo-sacral spondylosis and rotator cuff syndrome.

### **3.4 Instrumentation**

#### **Questionnaire**

A semi-structured questionnaire was used as a data collection instrument for this study (See Appendix 2). This questionnaire was developed by the researcher using the health, safety and risk manual at this specific beverage company. This manual contains information on the occupational health, safety and risk control regulations and guidelines of the Kwazulu-Natal region. It is reviewed on a quarterly basis by the safety committee to ensure its compliance with the Occupational Health and Safety Act and regulations. This questionnaire included both open and close-ended questions to capture information in four categories from the participants.

#### **The categories included:**

- (a) Personal details, including age, gender, population group, number of years employed at this company.
- (b) General working information such as workplace training, shift work and working conditions.
- (c) Awareness of safety protocol, focusing on health and safety rules, policies and procedures.
- (d) Worker recommendations addressing aspects of workplace health and safety and suggestions for improvement.

#### **Questions were answered by a combination of:**

- (a) Providing specific information relating to personal details and general working information,
- (b) crossing yes/no/unsure boxes and



- (c) open ended questions allowing for descriptive comments relating to worker recommendations

In order to ensure that research done with non-English speaking sectors of the Southern population is valid and concurrently reliable, all questionnaires developed in different cultures should be subjected to a rigorous translation procedure (Jelsma et al., 2002). For the purpose of this study a forward and backward translation process was employed. Furthermore, it is equally important to test the reliability and validity of the translated version, particularly if the source culture is very different to the culture in which the instrument is to be utilised (Jelsma et al., 2002). Therefore all questionnaires were piloted prior to distribution.

Face validity was assumed as the questionnaire was based on the occupational health, safety and risk control manual utilized by the company. Content validity of the questionnaire was addressed as input from experts in physiotherapy research and occupational health was consulted to scrutinise a draft copy. It was difficult to determine the predictive validity of the questionnaire as this would entail determining whether the questionnaire did in fact predict health and safety practices and as anonymity was maintained, it was not possible to link respondents to the questionnaire with those observed.

As the questionnaire aimed to test knowledge, a test-retest reliability study were not done as respondents might consult their training manuals and be able to respond more appropriately on a second occasion.

### **Site Inspection and Observation Checklist**

A site inspection and observation was conducted by the researcher over 2 days during a two-week period. Workers were monitored for their compliance of health and safety protocols and procedures. By means of a checklist, the researcher noted how many and what health and safety violations took place over that period. This was calculated as the number of violations per worker present at the time. This checklist included 10 main categories and 34 sub-categories (See Appendix 5). This checklist was based on the *General Safety Rules and Guidelines* section of the health, safety and risk control manual at this specific company. Face validity was assumed as the checklist was based on the occupational health, safety and risk training manual utilised by the company. Content validity of the checklist was addressed as input from experts in physiotherapy research and occupational health was consulted to scrutinise a draft copy.

### **Injury Data Analysis Spreadsheet**

The researcher conducted a retrospective analysis of the injury data at this specific beverage company over a six-month study period from July 2004 to December 2004. This was achieved by means of passive surveillance whereby the clinical records, workman's compensation records, insurance claims and accident reports were analysed. Results of this analysis were computed in a self-complied injury data analysis spreadsheet. This spreadsheet contained ten categories (See Appendix 6). Face validity of the spreadsheet was assumed as it was designed to gather specific information regarding cause and site of injury and was developed after consulting relevant literature on gathering of

epidemiological information regarding musculoskeletal injury (Hamzat, Adeniyi, Awolola, Olaleye, 2004; Jelsma et al., 1997).

### **3.5 Procedure**

#### **Pilot Study**

A pilot study was conducted to improve and refine the contents of the questionnaire. This pilot study was conducted at another beverage manufacturing company where 15 participants were chosen as a sample of convenience to complete the questionnaire. The results of the pilot study (See Appendix 7) indicated that the participants were similar to those in the study in terms of culture and that all questions were clear and unambiguous. Therefore no changes were made to the questionnaire after the pilot study.

#### **Gaining Access to the Company**

Permission to conduct this research study at this specific beverage manufacturing company was sought from senior management and the worker union representatives. This permission was gained by negotiating a meeting with the two parties. At this meeting the researcher introduced himself and given full specifications of the purpose of the study by explaining that the study will examine the health and safety knowledge, practices and injury pattern of workers based at this specific beverage company. The researcher also explained that the results of this study will be made available to senior management, the worker union representatives and general workers to enable this company to focus on effective strategies to promote health and prevent injuries at the workplace. A description of what this research study involved and the selection of the sample were also discussed.

The members of the meeting were informed that this study involves research. In addition, the name of the beverage manufacturing company will be kept secret and confidential by not referencing the name of the company throughout the dissertation unless prior written approval is obtained from the company.

The researcher also explained that this research study involved three phases. A clear statement was made by the researcher that participation in the questionnaire (phase 1) and occupational clinic records part (phase 3) of this study were entirely voluntary, while for the observational part (phase 2) of the study permission was needed from the members of the workers union as this part of the study would be invalidated if only if only those workers who agree to participate are observed during the site visits. The researcher also explained that the risks and/or discomforts involved in this study are minimal in that no answers, behaviours and injury data will be traced back to any one person and no person's name will be given to anyone, apart from the researcher and if necessary the members of the Ethics Committee, which ensures that this study does not harm any of the participants.

A copy of the proposal was submitted to both parties at the end of this meeting. Written permission was obtained from senior management at this specific beverage company allowing the researcher unlimited access to the workplace and occupational clinic records as well as expressing support for this study.

### **Gaining Informed Consent**

Informed consent to complete the questionnaires and to access occupational clinic records for those workers who have reported to the occupational health

clinic with occupational injuries during the six-month study period was obtained from the participants at this specific beverage company. This was achieved by arranging group discussions with workers at each of the eleven departments. The participants were requested to sign a consent form, which was handed out at the end of the respective group discussion. A Zulu version of the consent form (See Appendix 3) was also made available to participants whose first language was not English.

The consent form acquainted the participants with the purpose of the study, the timeframe by which the questionnaire should be completed and returned to the researcher as well as the associated risks and benefits involved. The researcher also informed workers that for the observational part of this study permission was sought from the Union representatives. To avoid this study being imposed on workers, all representatives present at this group discussion were allowed to ask questions, raise concerns and/or clarify issues regarding the study. Assurance regarding the anonymity of the participants and the maintaining of strict confidentiality with regard to medical records accessed was provided at this discussion. In addition, the workers were informed that the site visits would be unannounced to ensure that the researcher remains as anonymous as possible. At the end of this discussion the questionnaires were distributed to the participants. A Zulu version of the questionnaire (See Appendix 4) was made available to participants whose first language was not English.

The participants were requested not to receive any assistance from any other person when completing the questionnaire to ensure a true reflection of their ability and knowledge. However, workers who could not read and/or write were

allowed to direct any question(s) needing further clarification to the researcher only. The researcher reviewed each query on an ad hoc basis and assistance was provided when warranted. The contact details of the researcher were made available on the consent form. The consent form was signed in the presence of a witness.

### **Data Collection**

One week after the questionnaires were distributed to the participants, a visit to each department at this specific beverage company was negotiated. This visit was used to collect the completed questionnaires. For the observational part of this study the researcher visited the company on two days over a two week period to analyse the health and safety behaviour of workers. The researcher employed a structured observational technique whereby the observation took place on scheduled dates and only certain aspects were recorded. Each behaviour relating to health and safety violations were recorded using a checklist (See Appendix 5).

To minimise the Hawthorne effect the researcher visited the company on unannounced days and attempted to observe as unobtrusively as possible. This ensured that workers did not make a greater effort to perform better simply because they were being watched. The procedure for accessing occupational clinic records and collecting injury data was achieved by means of passive surveillance. A visit to the occupational health clinic was negotiated to access the retrospective injury data that occurred over the six-month study period. The injury data was analysed and entered into a self-compiled spreadsheet (See Appendix 6).

### **3.6 Data Analysis**

The questionnaire responses was analysed using the Statistical Package for Social Sciences (SPSS Inc, 1997). Descriptive statistics such as percentages, frequencies, means, ranges and standard deviations were calculated to describe the categorical data such as age, gender, general working information and awareness of health and safety procedures and protocols. The ordinal data such as worker recommendations regarding workplace health and safety was post-coded and analysed using descriptive statistics.

An independent t-test was used to determine whether there was a significant difference between the scores of workers in the workshop department and administrative support department on the knowledge questionnaire. The same test was used to determine whether there was a significant difference in the mean number of sick days that males/females and general workers/management take off work as a result of occupational injury over a six-month period. A Mann-Whitney U test was used to determine whether there was a significant difference in the mean number of shifts worked per week between males and females. Data was depicted using table and figures. Chi-squared tests were used to determine whether there was an association between those injured and gender and work setting. Pearson's correlation was calculated to determine whether the age of workers and the number of sick days taken off work as a result of occupational injury in males and females were significantly correlated. A scatter diagram was used to depict the correlation between the two variables. Probability calculations were determined and set at a 0.05 significance level. Correlations were deemed strong if the r-value was greater than 0.80. An r-value of greater than 0.70 was considered to be moderately strong.

Dummy variables were created (male=1, female=0; administrative=1, workshop=0; intrinsic injury=1, extrinsic injury=0) and entered into multiple regression analysis to identify which of these factors were predictive of the number of sick days taken off work by those who had injuries. The burden due to each type of injury was calculated by multiplying the number of cases of each injury by the days taken off work.

### **3.7 Ethical Considerations**

Ethical clearance has been obtained from the University of Cape Town Ethics Committee prior to the commencement of this study. Informed consent was required from all participants prior to the completion of the questionnaire and from those workers to access their medical records who reported to the occupational health clinic with injuries during the six-month study period. This was achieved by means of a consent form that acquainted the participant with the purpose of the study, the timeframe by which the questionnaire should be completed and returned to the researcher as well as the associated risks and benefits involved associated with this study.

The method of gaining consent has been described under the procedure followed in carrying out the study. Participants were informed that although the researcher has access to the occupational clinic records no personal information were divulged to management. Furthermore, all health and safety violations observed by the researcher were grouped together with the other participants so that the workers cannot be identified.



Participants were entitled to decline to answer any question(s) that they may feel uncomfortable with pertaining to the questionnaire. All participants were informed that they do not risk job loss or any other institutional sanctions by not being involved in this research study. The researcher had no conflict of interest in doing this study at the specifically selected beverage manufacturing company. The outcome of the project will be made available to Senior Management, Union representatives and workers. The researcher will also make himself available to give a presentation to the workers on the outcome and recommendations of the study if required.

## **4. PRESENTATION OF RESULTS**

### **4.1 Questionnaire Analysis**

#### **Introduction**

Of the 327 questionnaires that were distributed, 282 were returned. Nine questionnaires were incomplete and were consequently excluded. In total 273 questionnaires remained which were included in the analysis. The effective response rate was therefore 83.5%.

#### **Demographic Data**

The mean age of the subjects was 32.8 years (Standard Deviation, SD=8.22) and the range was 17 to 52 years. The gender distribution of the subjects was 195 male and 78 female. This denotes a ratio of 71:29 as compared to 70:30 of all working subjects at the industry. A Chi-square test indicated that there was no significant difference ( $p=0.88$ ) between the ratio of the gender population in the sample compared to the population. Most subjects spoke English ( $n=187$ , 68.5%). The remainder spoke Zulu ( $n=78$ , 26.6%) while only eight workers spoke Afrikaans (2.9%). In terms of education, 111 (40.7%) had secondary level schooling, 72 (26.4%) had technical trade schooling and 90 (32.9%) had tertiary level education. More than half of the subjects ( $n=151$ ) were from the workshop department while 122 were from the administrative support sector. This denotes a ratio of 55:45 as compared to 60:40 of all working subjects at the industry. A Chi-square test indicated that there was no significant difference ( $p=0.47$ ) between the ratio of the workshop department and administrative support sector in the sample compared to the population. The workers' knowledge of general safety and specific safety procedures and protocols were scored and grouped into workshop responses and administrative support responses. A t-test indicated

no significant difference ( $p=0.84$ ) in the knowledge between the two groups. The mean number of working years at this industry was 5.9 years ( $SD=4.36$ ) and the range was 1 to 17 years. All subjects ( $n=273$ ) were employed full-time.

### **Descriptive Data**

#### **General Working Information**

One-hundred and seventy (62.3%) of the subjects indicated that they have received work-related health and safety training for their particular job. One-hundred and twenty (44%) of the subjects reported that they are shiftworkers (i.e. working both normal and outside the scheduled work times). Of these, 102 subjects (85%) indicated that the change of shift affected their productivity and/or safety. The mean number of shifts worked per week was 0.88 ( $SD=0.99$ ). A histogram indicated that this data was not normally distributed and a Mann-Whitney U test determined that the rank ordering of the mean number of shifts worked per week was not significantly different between males and females ( $U=0.00$ ,  $p=1$ ). The subjects were also asked to indicate the length of each shift in hours. The mean length of shifts worked per week was 5.3 hours ( $SD=5.97$ ).

Most of the subjects ( $n=174$ , 63.7%) believed that the health and safety team at this specific industry was fully committed to implementing a working environment that is safe, healthy and free from hazards. More than half of the subjects ( $n=140$ , 51.3%) felt that the health and safety training was adequate in order for them to safely and productively perform their duties. More than two-thirds ( $n=207$ ; 75.8%) of the subjects indicated that they report injuries on duty to their supervisors. About 55% ( $n=150$ ) of the subjects reported that the working environment sometimes prevented them from safely performing their tasks, while

43.6% (n=119) reported that the working environment was safe. Almost 40% (n=105) of subjects were unsure whether visitors to their department were issued with the correct safety devices and/or personal protective equipment when necessary.

### **Worker Awareness of Safety Protocol**

#### **General Safety**

One hundred and forty subjects (51.3%) were unable to correctly list any of the general health and safety rules applicable to this industry. Sixty three subjects (23.3%) correctly listed the four types of hazards within the working environment. Fifty three subjects (19.4%) were able to fully explain the dangers regarding the consumption of alcohol while on duty, while the remaining 220 (80.6%) had a poor understanding of the dangers associated with the consumption of alcohol while on duty.

#### **Specific Safety Procedures and Protocols**

Thirty-eight subjects (13.9%) had an adequate understanding of the safety precautions to be taken if there was a fire or explosion, 81 (26.7%) had a mild to moderate understanding while 154 (56.4%) failed to describe any of the safety procedures during a fire or explosion. One hundred and ninety-seven subjects (72.2%) knew that the first line of action for reporting injuries on duty was to report to the supervisor before the end of the shift. Seventy four subjects (27.1%) could describe the regulation for stacking and storing dangerous goods. In terms of safety regulations, 209 subjects (76.6%) were aware of the safety obligations that visitors must follow before entering and while on the working premises.

However, 123 subjects (45.1%) understood the steps to be followed when unsure of how to correctly use safety devices and/or personal protective equipment.

### **Worker Recommendations**

Subjects were asked to briefly explain any aspects of health and safety that should be addressed. One hundred and sixty-seven subjects (61.2%) felt that onsite supervisors should play a more proactive role in ensuring health and safety measures are implemented within the industry. Sixty five subjects (23.8%) felt that more health and safety workshops and in-service training should be implemented. The remaining 41 workers believed that management has failed to promote health and safety at the workplace. Seventy two (26.4%) of workers recommended that senior management provide more health resources and specialised safety courses to keep them current with health promotion and injury prevention strategies.

## 4.2 Site Inspection and Observational Analysis

**TABLE 2: Checklist depicting the number of health and safety violations observed**

TASK	NUMBER OF TIMES:		
	Behaviour observed n	Correctly done n	Incorrectly done n
<b>1. Good Housingkeeping</b>			
1.1 Waste and general rubbish placed in bins provided	27	25	2
1.2 Area kept free of excessive combustibles	13	10	3
1.3 Items stored in correct boxes/lockers	38	12	26
1.4 Chemicals spilled on floor adequately cleaned	2	0	2
<b>2. Stacking and Storage</b>			
2.1 Dangerous goods stored correctly	9	7	2
2.2 Roadways between stacks kept clear	17	14	3
2.3 Fire and electrical equipment easily accessible	7	3	4
<b>3. Walkways</b>			
3.1 Following demarcated walkways throughout the depot	21	14	7
3.2 Walkways clear and unobstructed	5	4	1
<b>4. Fire Protection, Prevention and Emergency Response</b>			
4.1 Correct type of fire extinguishers for hazard	6	4	2
4.2 Adequate number of fire extinguishers	6	5	1
4.3 Fire extinguishers mounted correctly	6	6	0
4.4 Staff following symbolic signs/notices demarcating danger	19	6	13
<b>5. Safety Devices (SD) &amp; Personal Protective Equipment (PPE)</b>			
5.1 Safety devices correctly stored	7	3	4
5.2 PPE issued (when necessary)	13	3	10
5.3 Authorised tampering or removal of safety devices	1	1	0
5.4 Defective SD and PPE reported to supervisor	3	3	0
5.5 Correct use of SD and PPE	13	8	5
<b>6. Hand Tools</b>			
6.1 In good condition	9	3	6
6.2 Correctly stored in toolbox	5	1	4
6.3 Work-specific tools used	3	2	1
6.4 Correct hand ergonomics when using tools	11	0	11

TASK	NUMBER OF TIMES:		
	Behaviour observed	Correctly done	Incorrectly done
<b>7. Work Area</b>			
7.1 Obstacles removed	3	2	1
7.2 Area well lit	5	4	1
7.3 Adequate ventilation	5	3	2
<b>8. Manual Lifting Techniques</b>			
8.1 Using correct manual lifting techniques	22	0	22
8.2 Asking for additional help when lifting heavy objects	22	3	19
8.3 Seeking authorisation when using lifting equipment	4	0	4
<b>9. Incident Reporting</b>			
9.1 Reporting incidents/injuries to supervisor	3	0	3
9.2 Reporting nature of incident	3	0	3
9.3 Reporting cause of injury	3	0	3
<b>10. General Safety</b>			
10.1 Visitors given consent form to sign before entering premises	7	0	7
10.2 Staff checking visitors' temporary identification card	7	0	7
10.3 Visitors issued with PPE (when necessary)	7	2	5

## **Introduction**

Table 2 above depicts the health and safety violations of workers present at the time of observation. Workers were observed for 12 hours per day over two days during a two-week period. This period of observation covered the morning work session on day 1 and the afternoon work session on day 2. There were a total of 212 workers and 332 behaviours observed during this period. The results of the observation are described below.

### **Good Housekeeping**

Eighty health and safety behaviours (24.1% of total) were observed for this task. On 25 occasions (31.3%) workers were observed to have correctly placed their waste and general rubbish in the bins provided. On ten occasions (12.5%) workers removed excessive combustibles from the working area. On twenty-six occasions (32.5%) workers were observed to have incorrectly stored items in the correct boxes/lockers and on two occasions (2.5%) workers were observed to have inadequately cleaned spilled chemicals on the floor.

### **Stacking and Storage**

Thirty-three health and safety behaviours (9.9% of total) were observed for this task. In response to this task, it was noted on seven occasions (21.2%) that workers correctly stored dangerous goods. On fourteen occasions (42.4%) it was noted that workers correctly kept roadways between the stacks clear. A site inspection of the workshop floor revealed that on four occasions (1.2%) the fire and electrical equipment was stored within easy access.

### **Walkways**

Twenty-six health and safety behaviours (7.8% of total) were observed for this task. On fourteen occasions (53.8%) workers were observed to have correctly followed the demarcated walkways throughout the depot. On further inspection, it was observed that three walkways were obstructed with working tools. However, of the five workers that used these walkways, only four workers (15.3 %) removed the working tools to ensure that these walkways were clear and unobstructed.



### **Fire Protection, Prevention and Emergency Response**

Thirty-seven health and safety behaviours (11.1% of total) were observed for this task. Workers were questioned in order to elicit a response on the knowledge of fire safety. It was noted that four workers (10.8%) knew the correct type of fire extinguishers to use, five workers (16.5%) could adequately identify the location of all fire extinguishers and six workers (1.8%) knew how to correctly mount the fire extinguishers. However, on thirteen occasions (31.1%) workers were observed not to have followed the symbols/signs demarcating danger when they entered dangerous work zones.

### **Safety Devices and Personal Protective Equipment**

Thirty-seven health and safety behaviours (11.1% of total) were observed for this task. Workers were observed on four occasions (10.8%) to have incorrectly stored safety devices. On ten occasions (27%) workers were observed not to have issued the correct safety device and/or any personal protective equipment when required. On only one occasion (2.7%) did a worker seek permission prior to tampering with or removing a safety device. On eight occasions (21.6%) workers were observed to have correctly used the safety devices and personal protective equipment.

### **Hand Tools**

Twenty-eight health and safety behaviours (8.4% of total) were observed for this task. On six occasions (14.3%) workers did not use hand tools that were in a good working condition, on four occasions (14.3%) workers did not store them in the correct toolbox, while on two occasions (7.1%) workers used the correct work-specific tools. On eleven occasions (39.3%) workers did not apply correct hand ergonomics when using their tools.

### **Work Area**

Thirteen health and safety behaviours (3.9% of total) were observed for this task. With regards to the working area, on two occasions (15.4%) workers correctly removed all obstacles, on four occasions (30.8%) workers ensured that there was good lighting while on three occasions workers worked in areas with adequate ventilation.

### **Manual Lifting Techniques**

Forty-eight health and safety behaviours (14.5% of total) were observed for this task. In twenty two cases (45.8%) workers were observed to have used incorrect manual handling techniques, while on three occasions (6.3%) workers asked for additional help when lifting heavy objects and on four occasions (8.3%) it was noted that workers did not seek authorisation prior to using lifting equipment.

### **Incident Reporting**

Nine health and safety behaviours (2.7% of total) were observed for this task following an occupational hand-tool injury incident at the industry. The three workers present at the time of the incident incorrectly reported the injury to the supervisor, the same three workers incorrectly reported the nature of the injury and the same three workers incorrectly reported the cause of the injury.

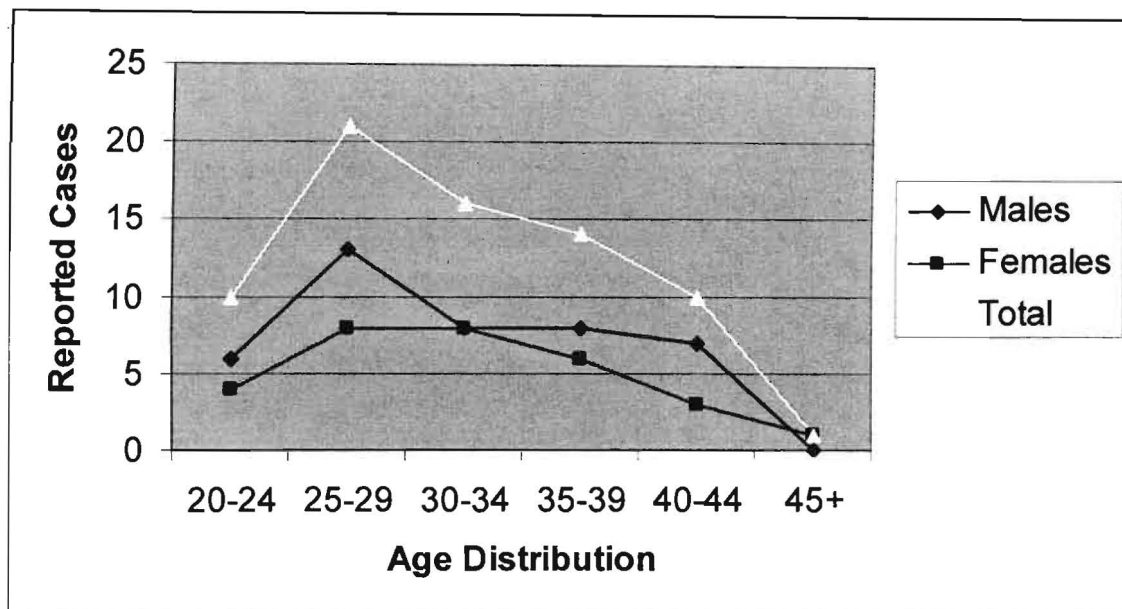
### **General Safety**

This section describes the behaviour related to visitors at the industry. Twenty-one health and safety behaviours (6.3% of total) were observed for this task. With regards to general safety it was observed on seven occasions that visitors were not given consent forms to sign before entering the premises, while on seven occasions it was noted that no worker checked the temporary identification cards of these visitors and on only two occasions were visitors given the correct personal protective equipment when required.

#### **4.3 Injury Data Analysis**

##### **Demographic Data**

There were 72 workers who reported to the occupational health clinic during the six-month study period (July 2004-December 2004) and their records were accessed and reviewed. This gives an incidence of 22% (72 per 327 workers) over the six month study period. The mean age of this group was 39.9 years (SD=6.4) and the range was 22 to 51 years. There were 42 males and 30 females. This denotes a 58:42 ratio. A Chi-square test indicated that significantly ( $p=0.00$ ) more males than females were injured compared to the number of workers at the industry. Most subjects were from the administrative support department ( $n=41$ , 56.9%) followed by the workshop section ( $n=31$ , 43.1%). Significantly more workers were injured in the administrative support section than in the workshop department compared to the number of workers at the industry ( $p=0.00$ ). Figure 1 below shows the relation between age, gender and number of reported cases in each group.

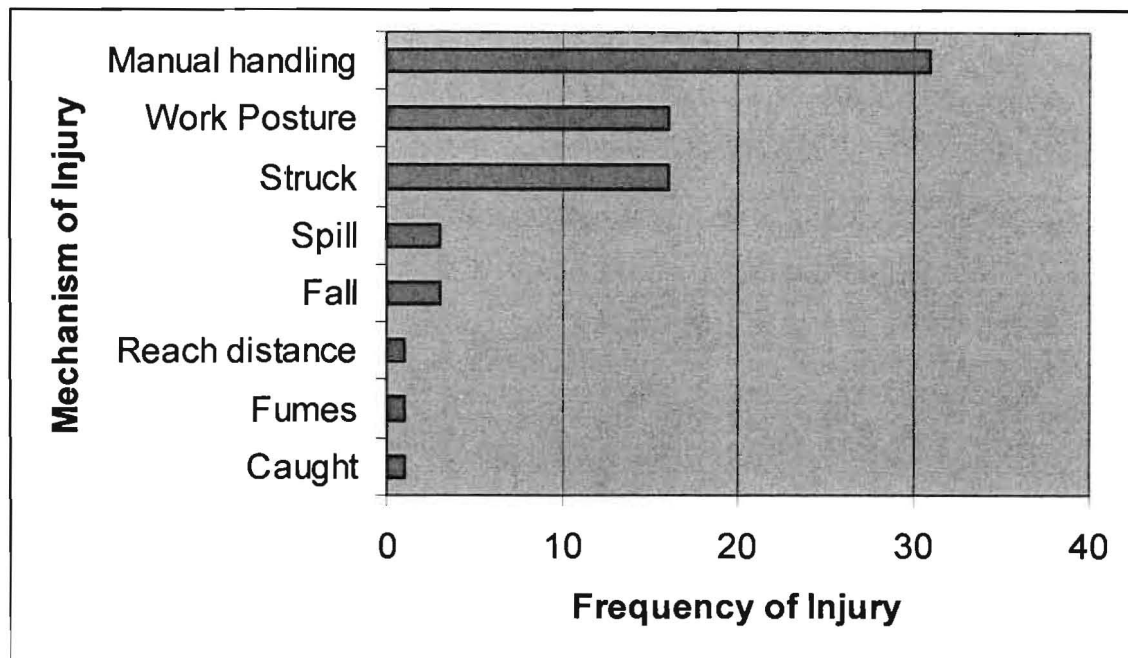


**Figure 1: Age distribution of workers that reported to the occupational health clinic during a six-month period, July 2004-December 2004**

Males between 25-29 years of age made up the majority (30.95%) of reported injury cases in this group, with the age group 30-34 years accounting for 19% and the age group 40-44 years for another 19% of the total number of reported cases. In females, the age groups 25-29 (26.7%) years and 30-34 (26.7%) years accounted equally for the majority of reported cases. The age group 45+ in both males (0%) and females (3.3%) accounted for the least number of reported cases.

## Descriptive Data

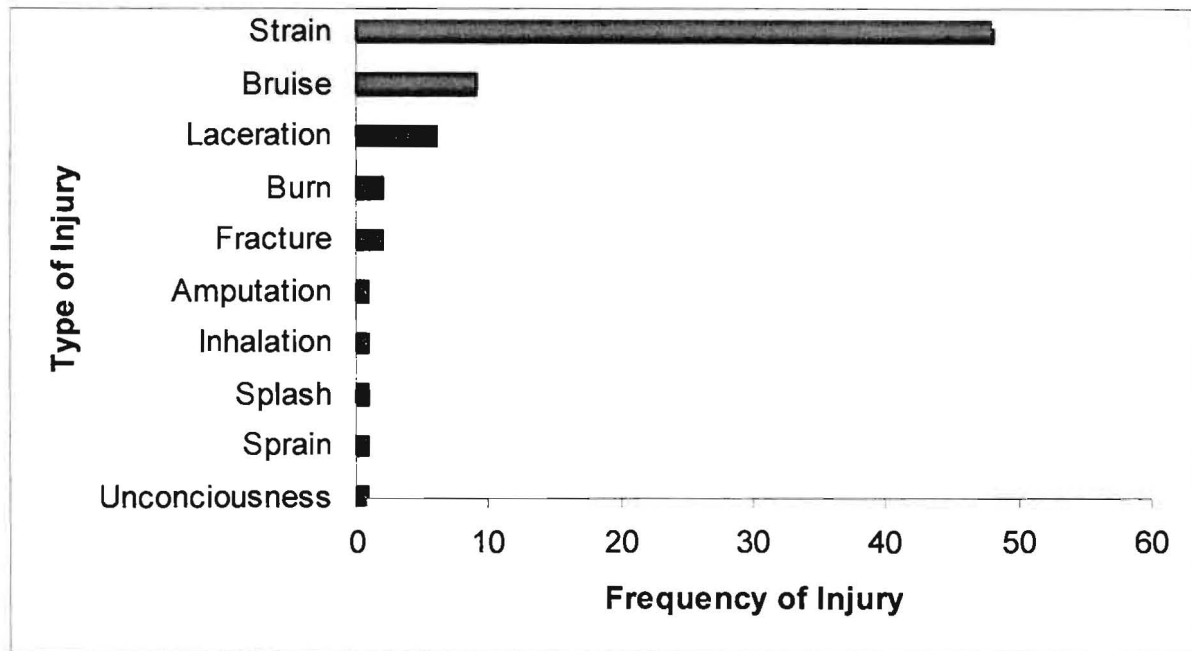
### Mechanisms of Injury



**Figure 2:** Frequency of both intrinsic and extrinsic mechanisms of injury reported to the occupational health clinic during a six-month period, July 2004-December 2004 (n=72)

Figure 2 above expresses the frequency of both the intrinsic and extrinsic mechanisms of injury of workers who reported to the occupational health clinic during the six month study period from July 2004 to December 2004, established retrospectively. The most common mechanism of injury was incorrect manual materials handling as reported in 31 (42.5%) of cases. Poor workstation posture and being struck by an object was cited as the mechanisms of injury in 16 (22.2%) of cases, respectively. The least number of reported cases which contributed to a combined total of 3 (4.2%) of cases were in the areas of using incorrect hand-reach distances, being exposed to poisonous fumes and being caught between a machine.

### Types of Injury



**Figure 3: Frequency of the type of injuries reported to the occupational health clinic during a six-month period, July 2004-December 2004 (n=72)**

Figure 3 above expresses the frequency of the type of injuries that was established retrospectively of workers who reported to the occupational health clinic during a six-month period. Strain injuries were the most common type of injury with 48 (66.7%) of injuries being reported to the occupational health clinic. Bruising accounted for a slightly higher incidence of injuries (n=9, 12.5%) as compared to lacerations which accounted for 6 (8.3%) of injuries. Other types of injuries that accounted for less than three reported cases included amputations, burns, fractures, inhalation, splashes, sprains and unconsciousness.

### Anatomical Sites and Classification of Injury

**Table 3: Classification of the extent of injuries according to anatomical sites sustained during a six-month period, July 2004-December 2004**

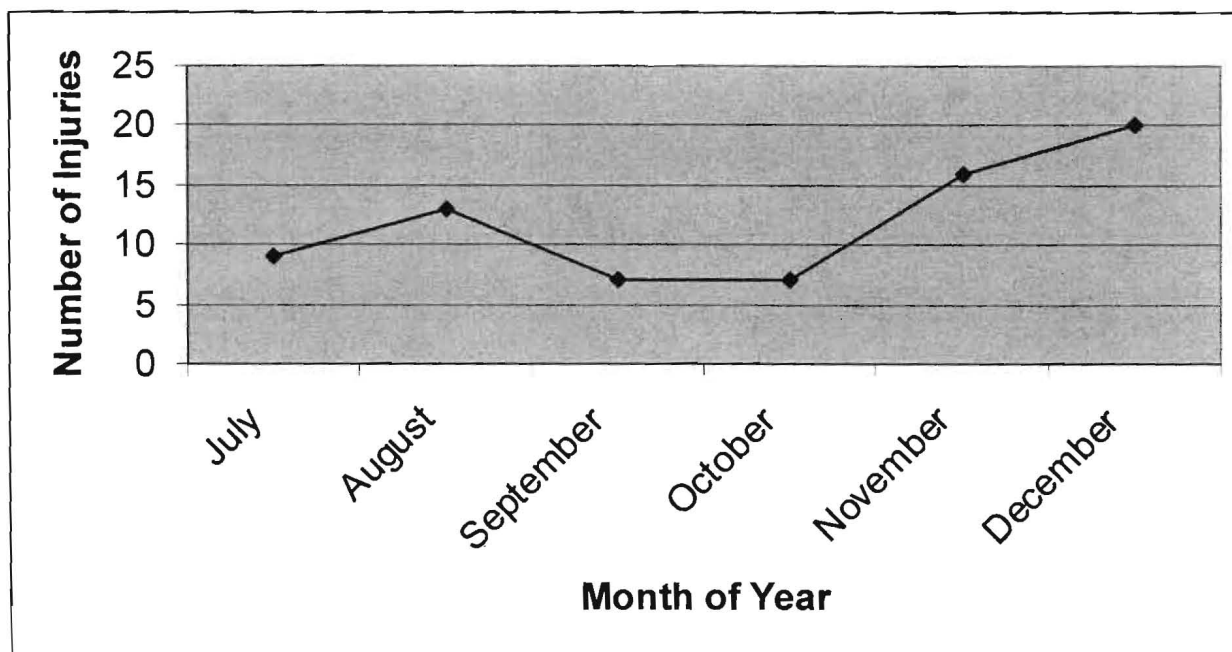
ANATOMICAL SITE	INJURY CLASSIFICATION			TOTAL INJURIES
	T	P	F	
Ankle	1	-	-	1 (1.4%)
Chest	-	1	-	1 (1.4%)
Eye	1	-	-	1 (1.4%)
Finger	-	1	-	1 (1.4%)
Head	1	-	-	1 (1.4%)
Internal	1	-	-	1 (1.4%)
Multiple	-	1	-	1 (1.4%)
Shoulder	1	-	-	1 (1.4%)
Face	3	-	-	3 (4.2%)
Hand	5	-	-	5 (6.9%)
Arm	9	-	-	9 (12.5%)
Neck	16	-	-	16 (22.2%)
Back	31	-	-	31 (43.1%)
<b>Total</b>	<b>69</b> <b>(95.8%)</b>	<b>3</b> <b>(4.2%)</b>	<b>0</b> <b>(0%)</b>	<b>72</b> <b>(100%)</b>

**Key:** T =Temporary Injury  
P =Permanent Injury  
F =Fatal Injury

Table 3 above presents a total of 72 injuries with 13 injured regions of the body. The spine/trunk was the site of 48 (66.7% of regions) injuries with the most frequently injured regions being the back (43.1%) and the neck (22.2%). The upper limb was the site of 16 (22.2% of regions) injuries with the arm being the most often injured region accounting for 9 (12.5%) of injuries. The lower limb, head region, internal structures and multiple injuries accounted for less than 5% of all reported injuries. The spine/trunk, upper limb and multiple regions accounted for 3 (4.2%) of permanent injuries.



#### Month of Injury

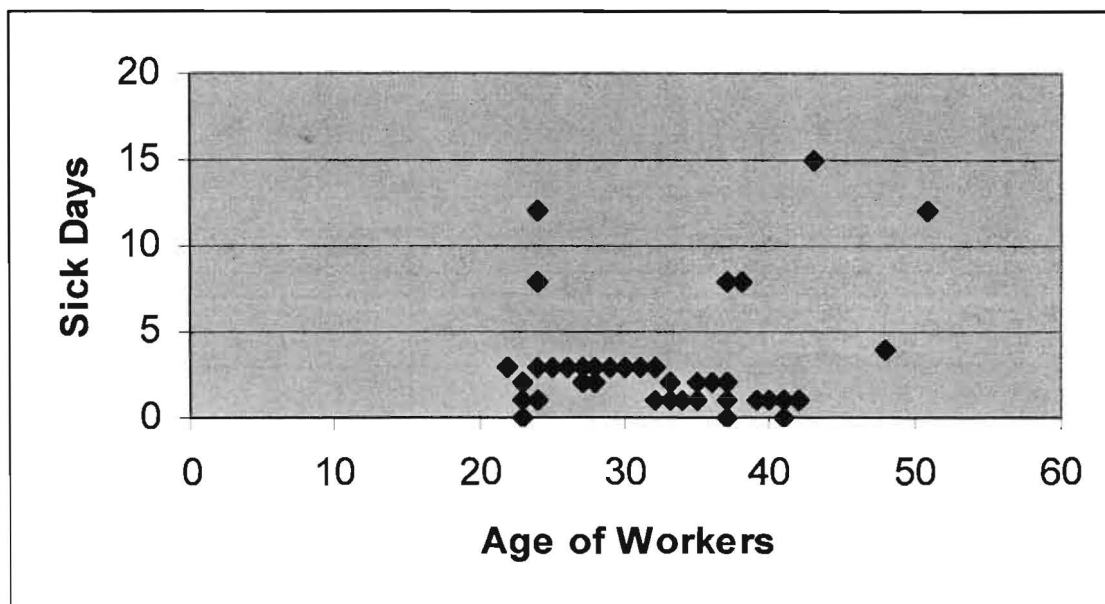


**Figure 4:** Mean number of injuries per month sustained during a six-month period, July 2004-December 2004 (n=72)

Figure 2 above depicts the seasonal changes of injuries sustained during a six-month period. Most of the injuries were sustained during the months of December (mean=20, 27.8%), November (mean=16, 22.2%) and August (mean=13, 18.1%). The least number of reported injuries were reported during the months of September (mean=7, 9.7%) and October (mean=7, 9.7%).

### Sick Days for Work-Related Injuries

The mean number of sick days off work for work-related injuries was 2.9 days (SD=2.9) with a range of 0 to 15 days. A t-test suggested a significant difference ( $t=-3.02$ ,  $p=0.00$ ) between the mean number of days taken off work as sick leave for work-related injuries between males (mean=3.7, SD=3.47) and females (mean=1.7, SD=1.05). No significant difference ( $t=0.45$ ,  $p=0.66$ ) was found between the mean number of days taken off work as sick leave for work-related injuries between general workers (mean=3.1, SD=2.98) and administrative support staff (mean=2.8, SD=2.86).



**Figure 5:** Pearson's correlation between sick days for occupational injuries and age of workers

Figure 5 shows a scatter diagram plotted to determine the correlation between the age of workers and the number of days taken off work as sick leave for occupational injuries. No significant correlation ( $p=0.133$ ) was found between the two variables. In other words, the number of sick days did not correlate with age of the worker.

**Which factors predict the number of Sick Days taken off Work for Occupational Injuries?**

**Table 4: Factors used to predict Sick Days taken off Work**

	B	Std.Err. of B	t(68)	p-level
Intercept	0.2	1.2	0	0.90
Department (Administration)	2.2	0.9	2	0.02
Gender (Male)	3.6	0.9	4	0.00
Cause (Intrinsic)	-0.9	0.7	-1	0.18

Gender, department and whether the injury was intrinsic (strain) or extrinsic (injury caused by trauma) were entered into a multiple regression model. The fit was poor, as the adjusted  $r^2$  was only 0.18. In other words, the model explained only 18% of the variance. However, department and gender were significant predictors of days taken off work, with workers in administration taking 2.2 extra days than those in the workshop and males taking off 3.6 extra days.

**Table 5: Co-efficients used to predict Sick Days taken off Work**

		B-Weight		B-Weight
Department	Workshop	0.0	Administration	2.2
Gender	Male	3.6	Female	0.0
Type	Intrinsic	-0.9	Intrinsic	-0.9
Intercept		0.2		0.2
Predicted		2.8		1.5
-95.0%CL		1.8		0.4
+95.0%CL		3.8		2.5

Table 5 demonstrates how these co-efficients can be used to predict the time taken off work. It can be seen that of those who were injured, a male worker employed in the workshop and who had an intrinsic injury took off a mean 3.8 days. A female worker with the same injury who worked in the administrative department took off a mean of 2.5 days.

**Which Type of Injury determines the most number of Sick Days taken off Work for**

**Occupational Injuries?**

**Table 6: Burden due to each mechanism of injury**

	Days off Means	Days off N	Days off SD	Burden Days x N
Manual handling	2.9	31.0	0.30	90
Chemical spill	9.3	3.0	4.62	28
Poor work posture	1.6	16.0	0.50	26
Struck by object	1.4	16.0	3.65	23
Fall	6.3	3.0	2.89	19
Caught between machinery	12.0	1.0	0.00	12
Poison fumes	8.0	1.0	0.00	8
In reach distance	2.0	1.0	0.00	2
All Groups	2.9	72.0	2.90	208

It can be seen that although injury due to machinery was responsible for the longest time off work, the burden due to poor handling skills, chemical spills, poor work posture and being struck by an object resulted in the greatest burden.

Similarly, Table 7 below demonstrates that although not severe in terms of the mean number of days taken off work, strains contributed to the greatest number of days off work.

**Table 7: Burden due to each type of injury**

Type	Daysoff Mean	Daysoff Std.Err.	Daysoff -95.00%	Daysoff +95.00%	N	Burden (Days*N)	% Burden
Strain	2	0.09	2.3	2.6	48	118	56.7
Laceration	1	0.27	0.3	1.4	6	5	2.4
Burn	12	0.46	11.1	12.9	2	24	11.5
Inhalation	8	0.66	6.7	9.3	1	8	3.8
Sprain	3	0.66	1.7	4.3	1	3	1.4
Bruise	0	0.22	-0.1	0.8	9	3	1.4
Fracture	8	0.46	7.1	8.9	2	16	7.7
Unconsciousness	15	0.66	13.7	16.3	1	15	7.2
Splash	4	0.66	2.7	5.3	1	4	1.9
Amputation	12	0.66	10.7	13.3	1	12	5.8
Total					72	208	100.0

### Relationship between Mechanism of Injury and Type of Injury

Table 8 below depicts the relationship between the mechanism of injury and the type of injury. Incorrect manual handling accounted for 31 (64.6%) strain injuries while poor work posture accounted for 16 (35.4%) strain injuries. Being struck by an object accounted for 9 (100%) bruises and 6 (100%) lacerations. It would appear that strains due to incorrect manual handling and poor work posture contributed 57% of the burden of days off work.

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**Table 8: Relationship between the Mechanism of Injury and Type of Injury**

	Strain	Bruise	Laceration	Burn	Inhalation	Sprain	Fracture	Unconsciousness	Splash	Amputation	Total
<b>Incorrect Manual Handling</b>	31	0	0	0	0	0	0	0	0	0	31
<b>Poor Work Posture</b>	16	0	0	0	0	0	0	0	0	0	16
<b>Struck by an Object</b>	0	9	6	0	0	0	0	1	0	0	16
<b>Fall</b>	0	0	0	0	0	1	2	0	0	0	3
<b>Incorrect Reach Distance</b>	1	0	0	0	0	0	0	0	0	0	1
<b>Chemical Spill</b>	0	0	0	2	0	0	0	0	1	0	3
<b>Poisonous Fumes</b>	0	0	0	0	1	0	0	0	0	0	1
<b>Caught between Machine</b>	0	0	0	0	0	0	0	0	0	1	1
<b>Total</b>	48	9	6	2	1	1	2	1	1	1	72

### **Relationship between Anatomical Site and Type of Injury**

Table 9 below depicts the relationship between the anatomical site and the type of injury.

Back and neck injuries were as a result of 31 (100%) and 16 (100%) strain injuries respectively. Arm injuries were a result of 5 (55.6%) bruises, 2 (22.2%) fractures and 2 (22.2%) lacerations.

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**Table 9: Relationship between Anatomical Site and Type of Injury**

	Strain	Laceration	Burn	Inhalation	Sprain	Bruise	Fracture	Unconsciousness	Splash	Amputation	Total
Back	31	0	0	0	0	0	0	0	0	0	31
Neck	16	0	0	0	0	0	0	0	0	0	16
Shoulder	1	0	0	0	0	0	0	0	0	0	1
Arm	0	2	0	0	0	5	2	0	0	0	9
Face	0	2	0	0	0	1	0	0	0	0	3
Chest	0	0	1	0	0	0	0	0	0	0	1
Multiple	0	0	1	0	0	0	0	0	0	0	1
Internal	0	0	0	1	0	0	0	0	0	0	1
Ankle	0	0	0	0	1	0	0	0	0	0	1
Hand	0	2	0	0	0	3	0	0	0	0	5
Head	0	0	0	0	0	0	0	1	0	0	1
Eye	0	0	0	0	0	0	0	0	1	0	1
Finger	0	0	0	0	0	0	0	0	0	1	1
Total	48	6	2	1	1	9	2	1	1	1	72



**Relationship between Injuries Sustained and Occupational Health and Safety Knowledge**

A t-test indicated no significant difference ( $p=0.84$ ) in the knowledge between the administrative support department and the workshop department. However, significantly more workers were injured in the administrative support department than in the workshop department compared to the number of workers at the company ( $p=0.00$ ) (See Table 10).

**Table 10: Relationship between Department and Injuries Sustained**

Department	Injured	Not injured	Total
Workshop	31	165	196
Administration	41	90	131
Total	72	255	327

Chi-square=11.00 ( $p=0.001$ )

## 5. DISCUSSION OF RESULTS

### 5.1 Questionnaire

#### Demographic Data

A high response rate (83.5%) was obtained for the questionnaire part of the study. Subjects from all departments at the company were included and it is likely that the results are a true reflection of the occupational health and safety knowledge at this specific beverage manufacturing company. The subjects, although not necessarily representative of the population of all companies, were similar in many respects to the industrial populations identified in other studies. As in other studies, the subjects were older (Bonnell, 1994; Henderson and Nancy, 2000; Struttman, 2004), predominantly male (Bonnell, 1994; Henderson and Nancy, 2000; McCommons, 2003; Struttman, 2004), English speaking (McGuire, 2004; Henderson and Nancy, 2000; Struttman, 2004) and were employed full-time (Bonnell, 1994; Henderson and Nancy, 2000; Mackenzie, 2000).

#### General Working Information

Almost half of the workers (51.28%) received work-related health and safety training for their job. Several studies (Columbus, 2003; Gale, 2000; Mele, 2001; Schwolsky, 2003) have indicated that inadequate health and safety training puts the worker at a high risk of injury. Of concern is that such a large proportion of workers at this company did not receive any form of safety training. Workers need to be informed about the specific hazards that may present at the workplace and be orientated to the safety rules and procedures that are applicable to alleviate or reduce the impact of these hazards. This form of training must be ongoing. Health professionals and management must be more

proactive in educating the workforce on the potential risks of the working environment and incorporate strategies on how to prevent them.

Another factor that may be associated with injury is shiftwork. Of the 120 shiftworkers in this study, 102 (85%) indicated that the change in shift affected their productivity and/or safety. In this regard, industrial management has the responsibility of ensuring an optimal working environment that is conducive to remaining awake and alert and to monitor the performance of workers at the different working schedules to promote safety and production. Supervisors need to be sensitive to the challenges faced by workers working outside conventional hours. Health professionals must ensure that shiftworkers are made aware of the potential problems associated with shiftwork and offer appropriate advice. Some of the advice may include dietary planning, modifications to their sleep regime and even adjustments to the working environment by making provisions for adequate rest facilities during shiftwork (Mayo, 2002).

This study, which has found no significant difference in the mean number of shifts worked per week across gender, is in agreement with some studies (Coburn, 1997; McGuire, 2004; Sergio et al., 2002) that reported similar findings. The possible reason for this finding is that shiftwork at this company is fixed at 12 hours per shift. Shiftworkers are required to complete 2 shifts per week regardless of gender.

In some other studies (Hornstein, 2003; Mayo, 2002; Pallier, 2003) there was a discrepancy between the mean number of shifts worked between males and females. This is to be related to the nature of shiftwork at these companies. In

these studies the companies employed rotational shifts of 8 or 12 hours long. Workers at these companies had the option of working either shift, with males reportedly choosing to work the longer shift. The possible explanation for this choice is the extra remuneration for the longer shift. However, the problem of working prolonged shifts can often result in fatigue-related errors and accidents that are common factors that are associated with injury.

A meta-analytic study on the effects of shiftwork on sleep by Pilcher, Lambert, Moore and Huffcutt (1997) found that rotating shifts had a less negative effect on sleep and sleepiness than a fixed shift. Based on these findings the author suggests that rotating shifts is preferable as disturbances to the sleep cycle and accumulation of sleep debt is minimised.

As in previous studies (Albertson, 1990; King, 2002; Warner, 1991) most workers believed that the company was fully committed to implementing a safe working environment. Most of the workers also felt that they were adequately trained on health and safety issues to productively and safely perform their jobs. Because of poor record keeping on the health and safety courses taught by management at this specific beverage manufacturing company, the number of training sessions that workers underwent to feel adequately prepared for their jobs was not established. However, management has the responsibility of creating, maintaining and documenting a training programme that is both cost-effective and comprehensive and to ensure competency from such training.

The initial training on safety must commence by educating workers on all aspects of safe working practices and this knowledge must be applied at the workplace.

Senior management also has the responsibility to ensure that special training needs are identified and specific training documents containing relevant information are readily available and maintained for future reference.

It is noteworthy that 75.82% of workers reported injuries on duty to their supervisor. But the ongoing nature of unsafe working practices was reinforced by the fact that 54.95% of workers reported that the working environment sometimes prevented them from safely performing their jobs. Unsafe working environments are almost universally reported in the literature. Albertson (1990) reported that mine workers have an inherently dangerous working environment which contributed to an estimated 58% of injuries, while Harman (2003) reported that workers in the construction company were found to routinely encounter hazards at the workplace. Pape (1997) reported that workers in the catering company were commonly exposed to sharp instruments within the working area.

Various factors need to be considered when addressing the process of eliminating hazards within the working environment. Technical expertise may need to be obtained in order to promote workplace improvements, the working environment may need to be adapted to suit the specific needs of the individual worker and the effectiveness of the occupational health service in addressing the welfare of the workers must be considered. In this way, safety in the working environment may come about and hopefully decrease the incidence of injuries.

### General Safety

Poor knowledge was noted in the areas of general health and safety rules that are applicable to this company, despite the fact that most workers believed they had received adequate health and safety training. On one hand, it is possible that workers have not taken the responsibility of educating themselves on the health and safety policies and procedures laid down by the company. On the other hand, it could be managerial fault in that the health and safety training could have been ineffectively taught.

Regardless of where the fault lies, supervisors must play a key role in explaining these policies and implementing the practical implications of the procedures. Both theoretical knowledge and practical competence must be acquired and maintained by all workers. The health and safety policies and procedures must be reviewed and updated annually to ensure that the latest developments and most effective strategies are used to preventing injuries at the workplace.

As in other studies (Brehm, Ruddick, Lundquist, 2003; McCommons, 2003 Maxwell, 2005) workers could not identify the types of hazards prevalent within the working environment. This could have an impact on safe working practices in that if workers are unable to identify the types of hazards at the workplace they may be unable to respond correctly to prevent an injury. Senior management and health professionals have an important role to comprehensively educate workers about potential hazards to which they may be exposed and strategies on how to prevent injury. There is obviously an urgent need for every worker to have practical training on basic first aid to respond correctly in the event of an injury.

In this study, as with other studies (Ames and Janes, 1992; Blum and Roman, 2002; Evans, 1999; Sell and Newman, 1992) there was a lack of knowledge of workers regarding the consumption of alcohol while on duty and the poor understanding of the associated dangers with the consumption of alcohol during working hours. This might be of particular concern in an alcoholic beverage manufacturing company. Companies need to develop and implement adequate strategies to reduce the ignorance and detrimental effects arising from the consumption of alcohol in the workplace. Such strategies may include carefully designing education workshops and incorporating random alcohol testing of all workers using high speed breath alcohol detectors as suggested by Sell and Newman (1992).

#### **Specific Safety Procedures and Protocols**

The knowledge of workers regarding specific safety procedures and protocols was poor. A large number of workers failed to describe any of the safety procedures during a fire or explosion. The health and safety team must adopt more advanced strategies to prepare workers in the event of a fire or explosion. Some suggestions include organising monthly fire drills and outlining the fire escape route, providing improved fire-fighting training methods and adopting other proactive strategies to alleviate the problem.

There is an obvious need to identify workers that do not participate in these fire-fighting training programmes. These workers must be informed of the hazards of the workplace and the potential risk of injury following an explosion. The importance of attending training workshops to alleviate or control workplace

hazards must also be highlighted. All workers must be encouraged to adopt a more positive attitude towards preventing injury at the workplace.

In this study, as with other studies (Landen and Hendricks, 1995 Mackenzie, 2000) workers knew that the first line of action for reporting injuries on duty was to report to the supervisor before the end of the shift. Although the majority of workers were aware of the safety obligation visitors must follow while on the working premises, less than half of the workers understood the correct procedure of issuing visitors with protective equipment and/or safety devices when required. The protocols regarding the issuing of protective devices must be regarded as important.

The public are now becoming increasingly aware of their rights and when negligence is suspected management are likely to face legal prosecution (Berwick and Leape, 1999). It is imperative that workers follow the stipulated guidelines of correctly issuing protective devices to avoid injury and any associated complications resulting from accidents. Every worker has a moral and legal obligation of giving visitors the most appropriate protective device (Cronin, 1999). The use of protective devices cannot be emphasised enough in preventing workplace injuries and it is suggested that every worker give maximum attention towards the prevention of onsite injuries.

#### **Worker Recommendations**

Most of the workers recommended that onsite supervisors must play a more proactive role in ensuring a safe working environment. It is suggested that management implement a rule that requires all supervisors to complete a series



of prescribed safety courses. The type and extent of training may be determined according to a risk assessment profile of that particular working area. Obviously a working area classified as high-risk would require more intense and specialised training. Supervisors can maintain the competency of their skills by updating their knowledge with annual refresher courses. This would ensure that supervisors are continuously and professionally trained in safety management to play a more key role of ensuring the prevention of onsite injury.

As with other studies (Bersch, 2005; Matoba, 2000; Olson, 1997; Tillinger, 2001) most workers recommended that additional health resources are made available to them. While the treatment of minor occupation injuries may be standard for some occupational health nurses, there are other medical conditions that require specialist care and adequately trained medical practitioners are not always available. It is recommended that priority be placed on recruiting and retaining adequately trained medical personnel. The additional medical personnel may also reduce the burden placed on existing team members. This in turn will hopefully promote improved occupational health care services.

## **5.2 Site Inspection and Observation**

### **Introduction**

The site inspection and observation of the working environment provided the researcher, as with previous studies (Isah, Asuzu, Okojie, 1996; Haque, 2000; Hu, Lee, Shiao, Guo, 1998; Tachibana et al., 1996), information about the compliance of workers regarding health and safety procedures and protocols. Workers in all departments were observed and it is likely that the safety violations observed are a true reflection of the health and safety compliance at this specific beverage manufacturing company. There was a high incidence (56%) of safety violations observed which is consistent with other studies. Albertson (1990) reported 58% in the mining company, Burkhard et al., (1993) reported 51% in the construction company and Gleeson (2001) reported 63% in the catering company.

### **Good Housekeeping**

Most of the workers maintained a clean working environment and their specific work areas were kept relatively clear of any obstructions. However, the majority of workers did not return the items used to their correct boxes/lockers. This may have serious repercussions, as also indicated in other studies (Greenberg and Chaffin, 1989; Pentikis, 1995; Punnett and Beek, 2000) that reported negligence, in that the tools or spares left about may cause other workers to trip-and-fall contributing to injury. Good housekeeping is the responsibility of every worker and a clean working environment is indicative of a successful health and safety programme.

### **Stacking and Storage**

Most of the workers correctly stacked dangerous goods and kept the roadways between these stacks clear. This is an encouraging sign towards health and safety compliance, as the accumulation of dangerous goods may block the roadways leading to potentially hazardous obstructions. Care must be taken to ensure that on no occasion should the stacks encroach onto the roadways. However, similar to other studies (Kamoing, 1987; Shilla, 1987) on the storage of equipment, most workers did not ensure that fire and electrical equipment was stored within easy access. This may be considered negligent as in the event of a fire or electrical accident many lives could be lost.

### **Walkways**

It was observed that the walkways at this specific beverage company were demarcated throughout the depots. Most of the workers observed did follow the demarcated signs and ensured that these walkways were clear and unobstructed. It is suggested that workers become familiar with the safest route to and from their work area as shortcuts can be dangerous.

### **Fire Protection, Prevention and Emergency Response**

Although most of the workers could correctly use and mount the fire extinguishers, it was observed that the majority did not follow the symbolic signs/notices demarcating danger. It is possible that most workers did not understand the symbolic signs/notices warning them of potentially dangerous situations and/or areas. It is suggested that another system of communication be used to ensure that workers are able to identify any dangerous or restricted areas. A colour coding system was mentioned in several other studies (Crim,

2003; Cronin, 1999; Rivenbark, 2004) as a means of identifying the contents of danger pipelines, sharp containers, demarcated areas etc. If this system is implemented it would require workers to become familiar with the colour coding system which in turn would promote health and safety and prevent injury.

### **Safety Devices (SD) and Personal Protective Equipment (PPE)**

The majority of workers did not correctly store safety devices or issue PPE when required. Examples of PPE used in this setting include helmets, hand gloves and identification cards. PPE must be issued to all workers that are exposed to areas in which the hazards cannot be totally removed. Furthermore, since every worker has different size requirements it is recommended that a selection of PPE be made available. It is suggested that workers with special needs have identified PPE adapted for them. On the positive side most workers who did use safety devices and/or issued PPE were observed to have used them correctly.

### **Hand Tools**

Most of the workers used hand tools that were in a poor condition. As with other studies (Greenberg and Chaffin, 1989; Pentikis, 1995; Punnett and Beek, 2000), a significantly large number of workers did not apply correct hand ergonomics when using their hand tools. In other words, workers did not position their hands correctly when using their hand tools. Workers must ensure that their hand tools are used correctly, always in a good working condition and correctly stored in the toolboxes. It is recommended that the supervisor check the hand tools on a regular basis and record any defects in the safety file. Defective hand tools are potential causes for accidents and injuries.

### **Work Area**

The office working area was kept relatively free of any obstacles. It was observed that on most occasions workers worked in areas that were well lit and adequately ventilated. Good ventilation and good lighting in the working environment are important factors. If there are any problems with these factors it may affect the health and efficiency of workers.

### **Manual Lifting Techniques**

As with other studies, the majority of workers were observed to have used incorrect manual lifting techniques. Bork et al., (1996) reported 47% of workers, Cromie et al., (2000) reported 65% of workers and Garg et al., (1991) reported 50% of workers using incorrect manual lifting techniques that contributed to LBP. In addition, most workers did not ask for additional help when lifting heavy objects or sought authorisation when using lifting equipment. The incorrect lifting techniques and awkward postures used by the workers can result in great strain being placed on the lower back. The preventative options used previously have been to train staff in correct lifting techniques (Scholey and Hair, 1989) and to create awareness of the problem and advocate self-responsibility (Hayne, 1981). Industrial physiotherapists can provide practical training sessions on correct lifting techniques and encourage workers to ask for additional help when lifting heavy objects. In addition, to acknowledge poor manual lifting techniques as an occupational hazard, it is suggested that pamphlets be compiled and distributed to all workers to teach them how to correctly lift objects and to educate them on the dangers of incorrect lifting.

### **Incident Reporting**

The majority of workers were observed to have incorrectly reported the cause and nature of injury to their supervisors. It is possible that these workers believed that the injury sustained was minor and did not warrant being fully reported. The onus is on the worker to correctly report the injury to the supervisor before the end of the shift no matter how minor the injury may seem at the time.

### **General Safety**

At this specific beverage company all visitors are expected to pass through Security Control (Gate 2) in order to register their access to and exit from the company. It was observed that most of the visitors were not given consent forms to sign before they entered the working premises nor were they issued with the correct PPE when required. The health and safety of visitors is the responsibility of the company, as visitors may go into unfamiliar places where they could endanger themselves. It is suggested that visitors be escorted to their destination within the company and be supplied with the correct PPE when taken into areas where such equipment is warranted.

### **5.3 Injury Data**

#### **Demographic Data**

The injury data over a six-month study period (July 2004-December 2004) of this specific beverage manufacturing company was obtained using the occupational health clinic records, workman's compensation records, insurance claims and accident records. An important finding is that the incidence of injury at this company is so high i.e. 22% compared to the national average of 7.91%. It is possible that the national average figure is conservative due to the lack of a uniform definition of injury, in other words not all injuries are reported. In addition, there may be variances in the data collection, analysis and methods of reporting injuries from company to company. An association was found between injury and gender, with males sustaining more injuries and between injury and work setting, with administrative support staff being more injured. The higher incidence of injuries in males could be due to negligence or recklessness (Flour and Buchanan, 2002). More injuries in the administrative support department imply that static, sitting work might lead to more problems than the tasks that the general workers do. As in other studies, most of the subjects that were injured were male (Ezenwa, 2001; Henderson and Nancy, 2000; Lewis and Cooper, 1989; Oordt and Aardt, 1994) and younger (Deveney, 2003; Frings, 2001; Konar, 2002; Ralske, 2002).

#### **Mechanisms of Injury**

Most of the injuries were as a result of incorrect manual material handling, reported by general workers, and is consistently reported in the literature as a common mechanism of injury (Buis, 1990; Davis, 1985; Evans, 1990; Gilad and Kirschenbaum, 1986; Kroemer, 1989). It is possible that workers are not

adequately trained in the correct techniques of manual handling.. Several studies (Bork et al., 1996; Cromie et al., 2000; Garg et al., 1991) have associated incorrect manual materials lifting with low back pain. More training, particularly in the area of manual lifting, is recommended. In this study, as with other studies (Nemeth and Balint, 1991; Sanders and McCormick, 1993), poor workstation posture was reported by the administrative support staff as a common mechanism of injury. If incorrect body postures are used at the workstation, such as excessive bending and twisting, to complete the task then this can be a significant factor contributing to injury. Idaho (2003) believes that the role of the industrial physical therapist is fundamental in giving appropriate advice and instructions on good working postures.

#### **Types of Injury**

Strains, bruising and lacerations were reported as the most common types of injury by the administrative support staff, which is also consistent with previous studies (Fanucchi, 2001; Rossi, 2001; Shelton, 2003). Most repetitive strain injuries can be prevented by adequate health promotion and injury prevention strategies. Health professionals must identify workers involved with repetitive movements and provide specific advice to avoid the repetition. Ayoub (2002) recommends modifying the repetitive task to allow for more beneficial working postures. Krucoff and Krucoff (2001) suggest reallocating workers to lighter duties following discomfort during repetitive movements.

#### **Anatomical Sites and Classification of Injury**

As in previous studies (Bork et al., 1996; Mierzejewski, 1997; Stellman, 1982), most of the injuries were to the spine/trunk with the back and neck being the



most frequently injured regions reported by general workers, of which medical care was sought. LBP has been acknowledged as a major occupational health problem (Bardin, 2002) and is associated with a high incidence both in this study and worldwide. In developed countries like the USA and Canada, LBP has been identified as the most frequent cause of disability among the workforce (Mierzejewski, 1997). Workers that are involved with the lifting of heavy objects are particularly at risk of developing lower back pain. The anatomical pathology of LBP is of a multi-factorial aetiology. This places enormous costs on the industrial health care budget of which the providers of health care, industrial physiotherapists in particular, are becoming increasingly accountable for the standards of care and the prevention of recurrence. It is suggested that a valid approach to the measurement of LBP be designed so that industrial physiotherapists can systematically document the outcome of the clinical interventions applied and compare these results against any significant changes of future interventions.

As with other studies (Grandjean, 1988; Lehman et al., 2001), the upper limb and spine/trunk accounted for permanent injuries. The upper limbs are consistently reported as the most vulnerable site for permanent injuries (Chaffin and Anderson, 1991; Huchingson, 1990). The most striking feature of the upper limbs is the functional role they frequently play in manipulative skills. As such, it is likely that serious injury does develop as a result of accidents and cumulative trauma or other factors leading to serious and/or permanent injury.

### **Month of Injury**

The seasonal distribution of injuries in this study has indicated that most of the injuries were sustained towards the end of the year. This seasonal distribution was similar to several other studies (Froeberg, 1985; Horne, 1985; Melamed et al., 1999). Because the workload at this specific beverage manufacturing company is higher towards the end of the year, it is likely that more accidents and injuries tend to occur. Furthermore, according to the guest book records workers bring more relatives to the company at the end of the year, especially during the festive season, than on any other part of the year. With factors such as the increase in workload and the distraction of the relatives (children included), it is inevitable that there would be an increase in injuries, accidents and even loss of production time.

It is suggested that if risk control measures are not strictly enforced then the company could face increased expenditure to control the incidence of injuries that may occur during this part of the year, particularly from the administrative support sector that reported relatively more injuries than the general workers. The management at this specific beverage company has the right to expect a satisfactory level of job performance from all workers without compromising their health and safety.

### **Sick Days for Work-Related Injuries**

There was a significant difference between the mean number of days taken off work as sick leave for work-related injuries between males and females. Several studies (Jamison et al., 2004; Lee, 2003; McVicar, 2003) have also shown significant differences between the mean number of sick days between males

and females. This study has found no significant difference in the mean number of days taken off work as sick leave between general workers and senior management. This finding was similar to some studies (Lewandowski, 2003; Wild et al., 2003), but different from others (Emigh, 1998; Fringes, 2001) worldwide. The lack of correlation between the age of workers and the number of sick days taken off work for occupational injuries indicate that senior management must provide equal attention to both young and older workers with regards to injury prevention.

#### **Which factors predict Sick Days taken off Work for Occupational Injuries?**

This study, similar to other studies (Andrea et al., 2003; Lydell, Baigi, Marklund, Mansson, 2005; Schroer et al., 2005) found that the department and the gender of the worker predicted the number of sick days taken off work for occupational injuries. From the statistical analysis it was clearly evident that the administrative support sector recorded the most number of injuries. In addition, males took more time off for their injuries. Therefore more attention should be paid to prevention of injuries in males and the administrative support department in order to reduce the number of sick days taken off work.

#### **Which Type of Injury determines the most number of Sick Days taken off Work for Occupational Injuries?**

This study has revealed that strains, burns, fractures, unconsciousness and amputations determined the most number of sick days taken off work. The role of physiotherapy in the management of the above conditions has been well documented (Cheng, Amick, Watkins, Rhea, 2002; McGeary et al., 2003). However, it must be noted that although burns, fractures, unconsciousness and

amputations accounted for a significant amount of sick days, only a few cases were reported in each type of injury. Therefore the occupational health team must continue to be involved in the prevention of these injuries and should legitimately concentrate mostly on strategies to prevent or reduce strain injuries.

#### **Relationship between Mechanism of Injury and Type of Injury**

This study, similar to other studies (Mital, 1999; Pope et al., 2001; Silverstein, Viikari-Juntura, Kalat, 2002) has revealed that there was a relationship between incorrect manual handling and poor work posture with strain injuries. Industrial physiotherapists have an important role in educating workers on proper manual handling techniques and correcting poor working postures to eliminate or reduce strain injuries.

#### **Relationship between Anatomical Site and Type of Injury**

As with other studies (Krause et al., 1997; Rugulies and Krause, 2005) there was a relationship between back and neck injuries with strain injuries. There is strong scientific evidence on the role of physiotherapy in the treatment of back and neck injuries (Levin, Millis, Marcellia, Little, 2005; Piotras, Blais, Swaine, Rossigrol, 2005). Workers that are of risk of developing low back pain and associated neck problems must be identified using a scientific approach based on anatomical, physiological and psychological considerations (Bretten, 1990) to reduce the burden of such injuries at the workplace.

### **Relationship between Injuries Sustained and Occupational Health and Safety Knowledge**

Although there was no significant difference in the knowledge between the administrative support department and the workshop department, more injuries were documented in the administrative support department. Therefore senior management must concentrate on the administrative support department and analyse which injury they sustain mostly to reduce the incidence of injury in this section of the company.

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## **6. RECOMMENDATIONS AND CONCLUSION**

### **6.1 Recommendations**

Based on the findings of this study the following recommendations are suggested:

#### **Occupational Health and Safety Knowledge:**

More training is required in the area of general health and safety rules applicable to this company.

Workers need to understand the following specific health and safety procedures:

- a) Procedure during a fire or explosion.
- b) Procedure for issuing visitors with the correct protective equipment and/or safety devices.

Onsite supervisors must maintain their competency on health and safety issues by updating their knowledge with courses/workshops annually.

#### **Occupational Health and Safety Practices:**

Workers must return all equipment used to their correct boxes/lockers.

Dangerous goods in the workshop area must not encroach onto the roadways.

Workers need to follow demarcated walkways throughout the depot.

Defective hand tools must be recorded in the safety file.

Workers must ask for additional help when lifting heavy objects.

All health and safety incidences must be correctly reported to the supervisors before the end of the shift.

Visitors to the company must be given consent forms to sign before they enter the working premises.

### **Injury Pattern:**

More attention must be placed on males and the administrative support sector with regards to injury prevention.

Adequate training on manual materials handling must be provided to all workers.

Introducing health promotion workshops to create awareness on back and neck care.

More surveillance during the month of December to reduce the incidence of injuries.

## **6.2 Conclusion**

The prevalence of injuries at this specific beverage company was high. The questionnaire analysis suggested that although workers reported receiving training on general health and safety, there was poor knowledge noted in the areas of specific health and safety policies and procedures. The site inspection and observational analysis have shown incorrect manual lifting techniques as the most frequent health and safety violation. The review of the injury data has revealed that the administrative support section recorded the highest incidence of injury followed by the workshop section. The lower back was the most injured part of the body and strains were responsible for most of the injuries. The epidemiological information elicited from this study will hopefully provide the senior management team at this specific beverage company with an understanding of the scope and aetiology of the problem. The findings emphasise the essential role of physiotherapy within the occupational health sector.

In conclusion, more specific health and safety education of all workers is needed to encourage a more dynamic and proactive attitude towards preventing injuries at the workplace. This training must address the multivariate factors of injury, such as the emotional, psychological and physical assaults on a worker. The efforts of addressing injury should not only be in the area of developing health and safety educational programme but also implementing and evaluating the effectiveness of such programmes. Physiotherapists must play a more proactive role in both preventative aspects as well as rehabilitative programmes. More studies are required at different types of companies to provide reliable epidemiological information on occupational injuries that could lead to effective preventative strategies. It is strongly recommended that the collection of epidemiological data be standardised to allow for comparison between different companies.



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University of Cape Town

## **APPENDIX I: CONSENT FORM**

### **INTRODUCTION**

My name is Laran Chetty. I am currently studying towards a Masters Degree in Physiotherapy at the University of Cape Town. I am conducting research at your industry with the general aim being to address the factors that contribute to injury and to evaluate your responses towards health and safety. Should you have any question(s) regarding this study or require any clarification on any aspect of this questionnaire, then please do not hesitate to contact me on any of the following telephone numbers:

031-2672277 (H)

031-2401457 (W)

0731282294 (C)

### **PURPOSE**

The main purpose of this study is to investigate the factors that contribute to injury at a specific Beverage Manufacturing Industry and to examine the knowledge and practices of workers regarding workplace health and safety. This information will assist the industry to improve its health and safety status and to address gaps in the existing protocols and procedures. This industry will then be able to focus on promoting health and preventing injury effectively at the workplace. Therefore this study is of importance to all workers within this industry.

### **WHAT DOES THIS STUDY INVOLVE?**

This study involves research. You, as a worker at the industry, will be required to complete a questionnaire which the researcher will collect after one week. The questionnaire includes questions about your gender, age and educational and training levels. There are also questions about your conditions of work, how much you know about the safety protocols and procedures and whether you follow these guidelines. We are also interested in any recommendations that you might wish to make regarding improving the health and safety of yourself and the other workers at the industry. We ask you not to receive any assistance from any other person when completing the questionnaire to ensure a true reflection of your ability, knowledge and ideas. However, should you have any difficulty in completing this questionnaire then you are entitled to direct any concerns to the researcher only for assistance (See Contact Details Above). You will also be observed for health and safety behaviour over two days. You will not be informed of the dates and times for these observations to prevent you from performing better simply because you are being watched. Furthermore, your medical records will be looked at if you have reported to the occupational health clinic with work-related injuries over the last six-months.

### **IS THERE ANY RISK OR DISCOMFORT INVOLVED?**

The risks and/or discomforts involved are minimal. The information gathered from the questionnaires including your name or any other information which might identify you will be kept confidential. But during the observational and records part of this study the researcher would be able to identify all the participants of this study. However, regardless of what safety violations the researcher witnesses during the observation or what injury data is extracted from the medical records for the purpose of this study, all information will be grouped together with information from the other participants so that you cannot be identified. You are assured that all answers, behaviours and injuries will not be traced back to any one person. No person's name will be given to anyone apart from the researcher, and if necessary the members of the Ethics Committee which

ensures that this study does not harm you, the participants in any way. You do not risk job loss or any other institutional sanctions by not participating in this research study.

**WILL COMPENSATION BE MADE FOR YOUR PARTICIPATION?**

No, there will be no payment or reward if you take part.

**WHO WILL RECEIVE THE RESULTS OF THE STUDY?**

The researcher will give the results of the study, without identifying any person by name, to Senior Management, the Union Representatives and to yourselves. In this way, changes in safety practice might come about which will make your working environment safer.

**CAN I WITHDRAW FROM THE STUDY?**

Your participation in this research study is entirely voluntary and therefore you may withdraw from the questionnaire and records part of the study at any time. If you choose not to participate there will be no negative consequences. Should you decide to participate, you are entitled to decline from answering any question(s) pertaining to the questionnaire. But for the observational part of this study permission will be sought from your Union Representatives. Your participation in this study will aid in the understanding of the factors contributing to injuries specifically within your industry.

Your signature below indicates that you have read and understood the above information, that you have no question(s) regarding the study and that you freely volunteer to participate in the study.

\_\_\_\_\_  
Subjects' signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness' signature

\_\_\_\_\_  
Date

## APPENDIX II

## QUESTIONNAIRE

**INSTRUCTIONS:** Please answer all questions by placing a cross (X) in the appropriate block(s) or by referring to the specific instructions that have been indicated.

### 1. PERSONAL DETAILS

1.1 Name (optional) \_\_\_\_\_

1.2 Gender:

1.2.1 Male	
1.2.2 Female	

1.3 Age: \_\_\_\_\_

1.4 Please indicate your first language:

1.4.1 English	
1.4.2 Afrikaans	
1.4.3 Zulu	
1.4.4 Other (please specify)	

1.5 Highest Educational Level:

1.5.1 No formal schooling	
1.5.2 Primary Level (Grade 0-6)	
1.5.3 Secondary Level (Grade 7-12)	
1.5.4 Technical Trade School	
1.5.5 Tertiary Level	

1.6.1 Department:

1.6.1.1 Administration	
1.6.1.2 Plant Box	
1.6.1.3 Workshop	
1.6.1.4 Health Services	
1.6.1.5 Waste	
1.6.1.6 Risk Control	
1.6.1.7 Stores	
1.6.1.8 Other (please specify)	

1.6.2 Briefly explain your job description: \_\_\_\_\_

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1.7 Number of years employed at this industry: \_\_\_\_\_

1.8 Nature of employment:

1.8.1 Full-time worker	
1.8.2 Part-time worker	
1.8.3 Occasional worker	
1.8.4 Contractual worker	
1.8.5 Other (please specify)	

## 2 GENERAL WORKING INFORMATION

2.1.1 Have you received any work-related health and safety training for your particular job? \_\_\_\_\_

2.1.2 If yes, briefly explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2.2.1 Do you work in shifts? \_\_\_\_\_

2.2.2 If yes, please indicate how many shifts you work per week: \_\_\_\_\_

2.2.3 Please indicate the length (in hours) of each shift: \_\_\_\_\_

2.2.4 Does the change of shift affect your productivity and/or safety? \_\_\_\_\_

2.3 Please complete the following table by placing a cross (X) in the most appropriate block:

	YES	NO	UNSURE
2.3.1 Do you believe that the health and safety team at this specific industry is fully committed to implementing a working environment that is safe, healthy and free from hazards?			
2.3.2 Do you feel that you are adequately trained to do your job safely and productively?			
2.3.3 Do you report all injuries on duty (IOD's) to your supervisors?			
2.3.4 Does your working environment sometimes prevent you from safely performing your tasks (e.g. slippery floors, faulty machinery)?			
2.3.5 Are visitors to your department issued with the correct safety devices and personal protective equipment (when necessary)?			



### 3. WORKER AWARENESS OF SAFETY PROTOCOL

INSTRUCTIONS: Please indicate if you are aware of the following health and safety procedures and protocols by answering the questions below.

#### 3.1 General Safety

3.1.1 List four general health and safety rules applicable to this industry

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3.1.2 List the four types of hazards that you can come across in the working Environment

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3.1.3 Explain the dangers regarding the consumption of alcohol while on duty

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#### 3.2 Specific Safety Procedures and Protocols

3.2.1 Describe what you would do when there is a fire or an explosion

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**3.2.2 Explain the procedure for reporting injuries on duty**

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**3.2.3 Describe the regulations for stacking and storing dangerous goods**

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**3.2.4 What health and safety obligations must visitors follow before entering and while on the working premises?**

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**3.2.5 What steps would you take if you are unsure on how to correctly use safety devices and/or personal protective equipment?**

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#### **4. WORKER RECOMMENDATIONS**

**INSTRUCTIONS:** Please answer all questions in this section.

4.1.1 Are there any aspects of work-related health and safety that you feel should be addressed? \_\_\_\_\_

4.1.2 Briefly explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4.2.1 Do you have any recommendations regarding the improvement of health and safety within your industry? \_\_\_\_\_

4.2.2 Briefly explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

***Thank you for your co-operation.***

### **ISITHASISELO SOKUQALA III: IFOMU LEMVUME**

#### **ISINGENISO**

Igama lami ngingu Laran Chetty. Njengamanje ngenza izigu Zobungcweti (Masters Degree) kwi-Sayensi Yezokwelapha (Physiotherapy) eNyuvesi yase Kapa. Ngenza ucwaningo ngemboni yakho ngenhloso yokuveza izizathu ezingaholela ekulimaleni kanye nokuveza uvo lwakho mayelana nokuphepha kanye nezempilo. Uma ngabe unemibuzo ethile mayelana nalolu cwaningo noma ngabe udinga incazelo egcwele kuleli phepha lemibuzo ungangabazi nakancane ukungithinta kulezi zinombolo ezilandelayo:

(Eyasekhaya)	<b>031 267 2277</b>
(Eyasemsebenzini)	<b>031 240 1457</b>
(Eyeselula)	<b>073 128 2294</b>

#### **INHLOSO**

Inhloso enkulu yalokhu kufunda ingukuphenya ngezizathu ezinomthelela ekulimaleni embonini ekhiqiza Iziphuzo (Beverage Manufacturing Industry) kanye nokuphenya ngolwazi kanye nokwenziwa ngabasebenzi mayelana nezempilo nezokuphepha ezindaweni zokusebenza. Lolwazi luyosiza imboni ekuthuthukiseni ezempilo nezokuphepha kanye nokulungisa izikhala ezivela lapho kubekwa imithetho ethile kanye nezindlela okumele zilandelwe. Le mboni izobe isikwazi ukubhekana nokuthuthukisa ezempilo kanye nokuvimbela ukulimala okwenzeka njalo endaweni yokusebenza. Ngokunjalo- ke lolu cwaningo lubaluleke kakhulu kubo bonke abasebenzi bakulemboni.

#### **NGABE LESI SIFUNDO SIHLANGANISE NANI?**

Lesi sifundo sihlanganisa nocwaningo. Wena njengomsebenzi embonini kuzodingeka ukuba uliqede lolu hlo lwemibuzo umcwaningi azolithatha emva kwesonto elilodwa. Uhlelo lwemibuzo lubandakanya imibuzo emayelana nobulili bakho, iminyaka kanye namazinga emfundo nokuqeqeshwa. Kuneminye imibuzo emayelana nezimo zomsebenzi, kungakanani okwaziyo mayelana nezimiso zokuphepha nezinqubo noma uyazilandela lezi zeluleko. Singathokozela noma yisiphi isiphakamiso ongasenza mayelana nokwenza ngcono ezempilo kanye nokuphepha kwakho kanye nabanye abasebenzi embonini. Sicela ukuthi ungasizwa omunye umuntu uma uphendula le mibuzo ukuqiniseka ukuthi sibona ikhono lakho, ulwazi lwakho kanye nemicabango. Uma kwenzeka uba nezinkinga ugondane nomcwaningi ukuze uphothule uhlelo lwemibuzo futhi uvumelekile ukuthi ugondane nomcwaningi noma ingayiphi inkinga mayelana nosizo (bheka imininingane yokuxhumana ngenhla). Uzobhekwa ezenzweni zezempilo kanye nezokuphepha izinsuku ezimbili. Angeke utshelwe ngezinsuku nezikhaha zokubhekwa, ekuvikeleni ukusebenza kahle ngoba nakhu ubhekiwe. Ngaphezu kwalokho imibhalo yokulashwa kwakho izobhekwa ukuba ibikiwe yini emtholampilo mayelana nokulimala emsebenzini ezinyangeni eziyisithupha ezedlule.

#### **IKHONA YINI INGOZI NOMA UKUNGANELISEKI OKUBANDAKANYEKAYO?**

Izingozi noma ukungeneliseki okukhona kuncane. Ulwazi oluqoqwe ohlelweni lwemibuzo kubandakanya igama lakho futhi noma yiluphi ulwazi ongaluveza luzoba yimfihlo. Kodwa ngesikhathi sokubhekwa nokubhalwa kwalesi sifundo umcwaningi uzobe esekwazi ukuveza bonke abebekhona kulesi sifundo. Ngaphandle kwezinkinga umcwaningi ahlangebezane nazo ngenkathi ebheka ukulimala okuvela kwimininingwane

yokwelapha yalesi sifundo, lonke ulwazi luzohlangukiswa ndawonye nolwabanye khona kungeke kube lula ukuthi waziwe. Uyathenjiswa ukuthi zonke izimpendulo, izenzo kanye nokulimala angeke kwenzelwe muntu. Alikho igama lomuntu elizovezwa ngaphandle kokunyezela umcwaningi kanye namalunga ekomidi asebenzisane nalo (Ethics Committee) ukuqiniseka ukuthi lesi sifundo asikulimazi kanye nabo bonke abanye abakhona. Awuzifaki engozini yokulahlekewa umsebenzi noma ezinye izinkinga ngokungazibandakanyi kulolu cwaningo.

#### **NGABE IKHONA YINI IMIKLOMELO NGOKUBAMBA IQHAZA NA?**

Akuzuba khona mklomelo noma ukukhokhelwa ngokuthi ube yingxeny yethu.

#### **NGUBANI OZOZUZA NGOKUFUNDA?**

Abacwaningi bazosinika imiphumela yokufunda, ngaphandle kokukhombisa umuntu ngamunye ngegama kuziphathimandla eziphezulu, kwizinyunyana ezizimele kanye nawe, ngaleyo ndlela ukushintshela ekutheni uzikhuthazele wenze izinto eziphephile lokho kungakwenzela ukuba indawo osebenzela kuyona iphephe.

#### **NGINGAHOXA YINI EZIFUNDWENI?**

Ukuzibandakanya kwakho kulolu cwaningo lwezemfundo kungukuzinikela. Ngalokho unghoxa embuzweni noma ezintweni ezigciniwe noma eziyingxeny yemfundo noma nini. Uma ukhetha ukungazibandakanyi ngeke kube namthelela omubi. Kumele ukhethe ukuba yingxeny, ungazinikela ekutheni ungaphenduli imibuzo mayelana nezinto ezibuziwe. Kodwa izinto ezibonakala ziyingxeny yemfundo elawulayo zizolungiswa ezinyunyaneni zenu eziniphethe. Ukuzibandakanya kwakho kwezemfundo kungasibonisa kalula izinto eziwumthelela omubi nasekulimaleni embonini yakho.

Ukusayinda kwakho ngezansi kukhombisa ukuthi uyifundile wayizwa imininingwane ebhalwe ngenhla nanokuthi awunambuzo omayelana nezemfundo nanokuthi uvulelekile ekuzinikeleni ngokuzibandakanya kwezemfundo.

-----  
**Ukusayinda kwakho**

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**Usuku**

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**Ukusayinda kukafakazi**

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**Usuku**

## ISITHASISELO IV: AMAHLELO EMIBUZO

IMITHETHO: Phendula yonke imibuzo ngokubhala lolu phawu (X) ezikheleni ezifanele ngokuqondanisa nezikhala ezifanele.

### 1. Okumagondana Nawe

1.1 Igama (yinto oyithandoyo) \_\_\_\_\_

1.2 Ubulili \_\_\_\_\_

1.2.1 Owesilisa	
1.2.2 Owesifazane	

1.3 Iminyaka \_\_\_\_\_

1.4 Nikeza ulimi lwakho lokuqala \_\_\_\_\_

1.4.1 IsiNgisi	
1.4.2 IsiBhunu	
1.4.3 IsiZulu	
1.4.4 Olunye ulimi (lubalule)	

1.5 Nikeza izinga lemfundo ephakeme \_\_\_\_\_

1.5.1 Ongayanga esikoleni	
1.5.2 Isikole sabagalayo (1 banga O – kuya kwelesithupha)	
1.5.3 Isikole esinesisindo esingesikhulu (ibanga lesikhombisa kuya kelesumi nambili)	
1.5.4 Isikole solwazi oluthile kwezemisebenzi	
1.5.5 Isikole esimayelana nemfundo ephakeme	

1.6.1 Umnyango \_\_\_\_\_

1.6.1.1 Ukuphatha	
1.6.1.2 Ekutshaleni	
1.6.1.3 Indawo Yokusebenzela	
1.6.1.4 Kwezempilo	
1.6.1.5 Kwimfucuzo	
1.6.1.6 Ekuqondisweni kobungozi	
1.6.1.7 Ezitolo	
1.6.1.8 Kwenye indawo (ibalule)	

1.6.2 Chaza kabanzi ngokumayelana nomsebenzi wakho:

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 .....  
 .....

1.7 Ususebenze iminyaka emingaki: .....

## 1.8 Uhlobo lomsebenzi

1.8.1 Umsebenzi osebenze ngokuphelele / ngokugcwele	
1.8.2 Umsebenza ongena nje noma inini	
1.8.3 Umsebenzi osebenza ngezinsuku ezithile ezikhethekile	
1.8.4 Umsebenzi oqashelwe isikhathi esithile	
1.8.5 Okunye (sicela uchaze)	

## 2. IMININGWANE NGOMSEBENZI OWEJWAYELEKILE

2.1.1 Wake wathola ukuqeqeshelwa umsebenzi omayelana nezempilo noma ngokuzinikela emsebenzini wakho?

2.1.2 Uma impendulo yakho kungu-yebo, chaza kafushane:

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2.2.1 Ingabe usebenza ngezikhathi ezithile emsebenzini?

.....

2.2.2 Uma kunjalo sicela ukhombise / ubonakalise ukuthi ungena izikhathi ezingakanani .....

2.2.3 Sicela ukhombise ubude bezikhathi noma amahora owasebenzayo:

.....

2.2.4 Ingabe ukushintsha kwezikhathi ozisibenzayo akukuphazamisi yini ekuphepheni kwakho? .....

2.3 Sicela ugcalise leli thebula ngokufaka isiphambano (X) esikhaleni esifanele

	yebo	cha	anginasiqiniseko
2.3.1 Ingabe uyakholelwa yini ukuthi ithimba lezempilo nokuphepha kulomsebenzi okuwo lizibophezele ekwenzeni indawo osebenza kuyo iphephe, ihlanzeke?			
2.3.2 Ingabe uzizwa uqeqeshwe ngokwanele ukuthi wenze umsebenzi wakho ngokuphepha?			
2.3.3 Ingabe uyakubika konke ukulimala usemesbenzini kulowo okuphethe?			
2.3.4 Ingabe indawo yakho osebenzela kuyona kwesinye isikhathi iyakuvimbela ukuthi uvikeleke emsebenzini wakho (isibonelo: iphansi elishibilikayo, imishini engasebenzi kahle)?			
2.3.5 Ingabe kulo mnyango osebenza kuwona izivakashi ziyanikezwa izinto ezifanele zokuzivikela (uma kudingeka) ?			

### **3. UKWAZI KWABASEBENZI NGOMTHETHO WOKUPHEPHA**

<b>IMITHETHO:</b>	Veza ulwazi onalo mayelana nezokuphepha kanye nezempilo nemibandela yakhona ngokuphendula imibuzo elandelayo
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#### **3.1 Ukuphepha Okujwayelekile**

3.1.1 Bhala izindlela zokuphepha ezijwayelekile kanye nezempilo ngokwemithetho enikezwe yilemboni, nikeza zibe zine

.....  
.....  
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.....

3.1.2 Nikeza izinhlobo ezine zezingozi osuke wahlangabezana nazo endaweni yokusebenza

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3.1.3 Chaza ngobungozi obungadalwa ukuphuza utshwala ngesikhathi sokusebenza

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#### **3.2 Izindlela ezithile zokuphepha okuvunyelwené ngazo**

3.2.1 Awuchaze ukuthi ungenzenjani uma kungaqubuka umlilo noma ukuqhuma okungadalwa umlilo

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3.2.2 Chaza izindlela zokubika ukulimala okwenzeka ngesikhathi somsebenzi

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3.2.3 Chaza kabanzi ngoshimula omude kanye nokugcinwa kwezimpahla eziyingozi

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- 3.2.4 Yiziphi izindlela zokupheha kanye nezempilo ezingalandelwa izivakashi ngaphambi kokungena noma ngenkathi zingena nje endaweni yokusebenza

.....

.....

.....

- 3.2.5 Yiziphi izindlela ongazithatha uma ungenakho ukuzigonda kahle izindlela zokuphepha ezivumelekile noma okanye ongazisebenzisa ukuzivikela wena ugobo?

.....

.....

.....

#### 4. IZIPHAKAMISO ZOMSEBENZI

IMITHETHO: Phendula yonke imibuzo kulesi sigaba
---

- 4.1.1 Ngabe zikhona yini izindlela zezempilo kanye nezokuphepha ezincikelene/eziphathelene nomsebenzi obona ukuthi zingavezwa noma zingasetshenziswa

.....

- 4.1.2 Chaza kabanzi .....

.....

.....

- 4.2.1 Ngabe uneziphakamiso ezithile ezingasetshenziswa ekuthuthukiseni ezempilo nezokuphepha embonini osebenza kuyo?

.....

- 4.2.2 Chaza kabanzi .....

.....

.....

***Ngibonga kakhulu ngokubambisana nawe***

## APPENDIX V: OBSERVATION CHECKLIST

**Date:**

**Day:**

**Time:**

**Number of Workers Present:**

TASK	NUMBER OF TIMES:			Comments
	Behaviour observed	Correctly done	Incorrectly done	
<b>1. Good Housekeeping</b>				
1.1 Waste and general rubbish placed in bins provided				
1.2 Area kept free of excessive combustibles				
1.3 Items stored in correct boxes/lockers				
1.4 Chemicals spilled on floor adequately cleaned				
<b>2. Stacking and Storage</b>				
2.1 Dangerous goods stored correctly				
2.2 Roadways between stacks kept clear				
2.3 Fire and electrical equipment easily accessible				
<b>3. Walkways</b>				
3.1 Following demarcated walkways throughout the depot				
3.2 Walkways clear and unobstructed				
<b>4. Fire Protection, Prevention and Emergency Response</b>				
4.1 Correct type of fire extinguishers for hazard				
4.2 Adequate number of fire extinguishers				
4.3 Fire extinguishers mounted correctly				
4.4 Staff following symbolic signs/notices demarcating danger				
<b>5. Safety Devices (SD) &amp; Personal Protective Equipment (PPE)</b>				
5.1 Safety devices correctly stored				
5.2 PPE issued (when necessary)				
5.3 Authorised tampering or removal of safety devices				
5.4 Defective SD and PPE reported to supervisor				
5.5 Correct use of SD and PPE				
<b>6. Hand Tools</b>				
6.1 In good condition				
6.2 Correctly stored in toolbox				
6.3 Work-specific tools used				
6.4 Correct hand ergonomics when using tools				

TASK	NUMBER OF TIMES:			
	Behaviour observed	Correctly done	Incorrectly done	Comments
<b>7. Work Area</b>				
7.1 Obstacles removed				
7.2 Area well lit				
7.3 Adequate ventilation				
<b>8. Manual Lifting Techniques</b>				
8.1 Using correct manual lifting techniques				
8.2 Asking for additional help when lifting heavy objects				
8.3 Seeking authorisation when using lifting equipment				
<b>9. Incident Reporting</b>				
9.1 Reporting incidents/injuries to supervisor				
9.2 Reporting nature of incident				
9.3 Reporting cause of injury				
<b>10. General Safety</b>				
10.1 Visitors given consent form to sign before entering premises.				
10.2 Staff checking visitors' temporary identification card				
10.3 Visitors issued with PPE (when necessary)				

## APPENDIX VI: INJURY DATA

Department	Gender	Age	Mechanism of Injury	Type	Classification of Injury	Anatomical site	No. of Reported Cases	Month of Injury	Days off work
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## APPENDIX VII: PILOT STUDY REPORT

### Objective

The objective of the pilot study was to improve and refine the contents of the self-compiled semi-structured questionnaire prior to administration. The pilot study was undertaken at another beverage manufacturing industry. Results of the pilot study together with suggestions made by workers at the pilot industry were used in the final construction of the questionnaire.

### Subject Selection

A total of 15 workers were selected as a sample of convenience at the beverage manufacturing industry. Workers were selected regardless of age, gender, work experience or race.

### Final Questionnaire

The final questionnaire was divided into four sections:

Section I, is on **Personal Details** and consists of eight items

Section II, is on **General Working Information** and consists of three items

Section III, is on **Worker Awareness of Safety Protocol** and consists of two items

Section IV, is on **Worker Recommendations** and consists of two items

### Results

#### Personal Details

	Gender	Age	First Language	Highest Educational Level	Department	Total Years of Employment at the Industry
1	Male	23	English	Secondary Level	Plant Box	2
2	Male	36	English	Technical Trade School	Workshop	12
3	Female	28	English	Technical Trade School	Workshop	6
4	Female	25	English	Secondary Level	Workshop	1
5	Female	29	English	Secondary Level	Waste	2
6	Male	32	English	Technical Trade School	Workshop	7
7	Female	38	English	Technical Trade School	Workshop	9
8	Female	41	English	Tertiary Level	Risk Control	11
9	Male	42	Zulu	Tertiary Level	Administration	13
10	Male	27	English	Tertiary Level	Risk Control	4
11	Female	32	English	Secondary Level	Workshop	5
12	Female	49	Afrikaans	Tertiary Level	Administration	15
13	Female	40	Zulu	Tertiary Level	Administration	6
14	Male	33	English	Tertiary Level	Administration	6
15	Male	25	Zulu	Secondary Level	Workshop	2

### **Work-Related Information**

	<b>Nature of Employment</b>	<b>Work-related training</b>	<b>Shift-work</b>	<b>Shifts-worked</b>	<b>Length</b>	<b>Shift affecting</b>
1	Full-time	No	No	0	0	-
2	Full-time	No	Yes	2	12	No
3	Full-time	No	Yes	2	12	No
4	Full-time	No	Yes	2	12	Sometimes
5	Full-time	Yes	No	0	0	-
6	Full-time	No	Yes	2	12	No
7	Full-time	No	Yes	2	12	No
8	Full-time	Yes	No	0	0	-
9	Full-time	Yes	No	0	0	-
10	Full-time	Yes	No	0	0	-
11	Full-time	No	Yes	2	12	No
12	Full-time	Yes	No	0	0	-
13	Full-time	Yes	No	0	0	-
14	Full-time	Yes	No	0	0	-
15	Full-time	No	Yes	2	12	No

### **Worker Awareness of Safety Protocol**

#### **General Safety**

Eleven workers were unable to correctly list the general health and safety rules applicable to this industry. Only four workers correctly identified the four types of hazards within the working environment. Seven were able to fully explain the dangers regarding the consumption of alcohol while on duty, while the remaining eight had a poor understanding of the dangers associated with the consumption of alcohol during working hours.

#### **Specific Safety Procedures and Protocols**

Two workers had an adequate understanding of the safety precautions when there is a fire or explosion, seven workers had a mild to moderate understanding, while failed to describe any of the safety procedures during a fire or explosion. Nine workers knew that the first line of action for reporting injuries on duty was to report to the supervisor before the end of the shift. No worker could describe the regulation for stacking and storing dangerous goods. Twelve workers were aware of the safety obligations that visitors must follow before entering and while on the working premises. All fifteen workers believed that asking a colleague about how to correctly use safety equipment and personal protective equipment was adequate in preventing injuries.

#### **Worker Recommendations**

All fifteen workers felt that senior management should play a more pivotal role in ensuring health and safety measures are implemented within the industry. Five of these workers believed that management has failed to promote health at the workplace. In spite of this finding, only two workers recommended that health and safety training be implemented.

**APPENDIX VIII:**

**How much do beverage workers know about  
occupational health and safety regulations?**

Laran Chetty, Soraya Maart, Jennifer Jelsma

**Presented at the 2<sup>nd</sup> International  
Physiotherapy Congress, Sandton Convention  
Centre (25-28 May 2005)**

## **Introduction**

- Industrial injuries have not received adequate attention from physiotherapists in South Africa
- Physiotherapists should play an active role in the prevention and treatment of industrial injuries.
- An analysis of the factors contributing to injury in the workplace will assist in the development and implementation of effective industrial strategies

## **Aim**

The aim of this study was to determine the health and safety knowledge of workers at a specific beverage manufacturing industry

## **Methodology**

- Sample - All workers employed at a beverage manufacturing industry, regardless of age, gender, years of experience or race were included in this study.
- A questionnaire based on safety manual for the industry was used to capture information in four categories from the participants
- Categories included demographic data, general working information, workers awareness of safety procedure and protocols and worker recommendations
- Observation of workers behaviour was done over a two week period



## **Data Analysis**

- Descriptive statistics were used.
- Percentages, frequencies, means, ranges and standard deviations were used to describe the data set

## **Ethical approval**

- Approval was obtained from the UCT Medical Ethics Committee
- Informed consent was obtained from individuals and it was made clear that the questionnaires were anonymous and that there was no obligation to take part in the study.

## **Results**

- Of the 327 questionnaires distributed, 282 were returned
- 9 questionnaires were excluded due to incompleteness
- Therefore 273 were included in analysis, denoting an effective response rate of 83.5%

## Demographic data

- Male 71%
- Spoke English 69%
- Secondary level education 41%
- Workplace
  - Workshop Department 55%
  - Administrative Support 45%
- All subjects (n=273) were employed full-time

## General work information

- 51% received work-related health and safety training for their particular job
- 63% believed management was committed to implementing a working environment that was safe, healthy and free of hazards
- 55% reported that the working environment sometimes prevented them from safely performing their tasks
- 40% of workers were unsure whether visitors to their department were issued with the correct safety devices and/or personal protective equipment when necessary

## **Worker Awareness-General Safety**

- 51% were unable to correctly list any of the general health and safety rules.
- 77% could not identify the four types of hazards within the working environment
- 81% had a poor understanding of the dangers associated with the consumption of alcohol while on duty

## **Worker Awareness-Specific**

- 56% failed to describe any of the safety procedures prior to a fire or explosion
- 73% could not describe regulations for stacking and storing dangerous goods
- 55% did not know the procedure when unsure on how to correctly use safety devices and/or personal protective equipment (PPE)

## **Workers Recommendations**

- 61% felt the onsite supervisors should play a more proactive role in ensuring health and safety measures are implemented within the industry
- 24% felt that more health and safety workshops and in-service training should be implemented

## **Discussion**

- The knowledge profile of workers regarding health and safety were similar to those described by other authors
- The majority of respondents were unaware of safety protocols included in the industry manual and did not employ correct lifting techniques.
- This has implications for occupation health and safety training, medical management and rehabilitation

## **Conclusions**

- This study has revealed poor knowledge in the areas of general workplace health and safety and specific safety procedure and protocols.
- Physiotherapists should become more involved in injury prevention programmes and be aware of the necessary components of these programmes as they relate to specific industries.
- Significantly more attention should be paid to the development, implementation and evaluation of the effectiveness of health promotion and injury prevention strategies at this specific beverage manufacturing industry